

SCIENCE FICTION ADVENTURES

SEPTEMBER 1974 75¢ U. K. 30P 08702

THE MACHINE THAT SAVED THE WORLD MURRAY LEINSTER

HUGO Award-Winning Author

INTERSTELLAR
FLIGHT
Ben Bova

THE SMART ONES
Jack Sharkey

SAVAGE WIND
Harlan Ellison

THINK YOURSELF
TO DEATH
C. H. Thames

HOMESTEADS
ON VENUS
Lester Del Rey

THE NURSERY
COMMANDOS
Adam Chase

WORLDS AT WAR
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*With factual tongue and a lot of imaginative cheek,
our man Bova explores the possibilities of . . .*

INTERSTELLAR FLIGHT

By BEN BOVA

IMAGINE, if you can, an "Open End" television show in which the moderator is not David Susskind, but a science fiction writer. Gathered around the coffee table with him are a battery of experts in every field of science. The science fiction writer opens the discussion:

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(cont. on page 86)

I HAVE NO MOUTH AND I MUST SCREAM



It was the computer's revenge. In rage, in frenzy, he turned us into monstrosities, imprisoning us deep inside his endless banks. Now I am a great soft jelly thing.

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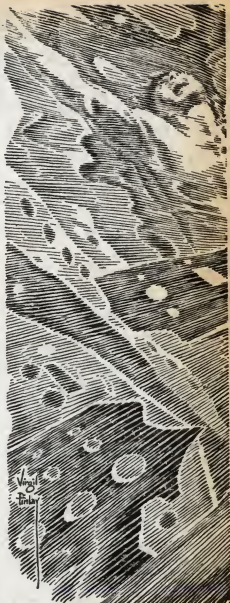
THE MACHINE THAT SAVED THE WORLD

By
**MURRAY
LEINSTER**

They were broadcasts from nowhere — sinister emanations flooding in from space — smashing any receiver that picked them up. If that defense could Earth devise against science such as this?

THE first broadcast came in 1972, while Mahon-modified machines were still strictly classified, and the world had heard only rumors about them. The first broadcast was picked up by a television ham in Osceola, Florida, who fumingly reported artificial interference on the amateur TV bands. He heard and taped it for ten minutes—so he said—before it blew out his receiver. When he replaced the broken element, the broadcast was gone.

But the Communications Commission looked at and listened to the tape and practically went through the ceil-



Did the broadcasts



foretell flesh-rending supersonic blasts?

ing. It stationed a monitor truck in Osceola for months, listening feverishly to nothing.

Then for a long while there were rumors of broadcasts which blew out receiving apparatus, but nothing definite. Weird patterns appeared on screens high-pitched or deep-bass notes sounded—and the receiver went out of operation. After the ham operator in Osceola, nobody else got more than a second or two of the weird interference before blowing his set during six very full months of CC agitation.

Then a TV station in Seattle abruptly broadcast interference superimposed on its regular network program. The screens of all sets tuned to that program suddenly showed exotic, curiously curved, meaningless patterns on top of a commercial spectacular broadcast. At the same time incredible chirping noises came from the speakers, alternating with deep-bass hootings, which spoiled the ju-ju music of the most expensive ju-ju band on the air. The interference ended only with a minor breakdown in the transmitting station. It was the same sort of interference that the Communications Commission had thrown

fits about in Washington. It threw further fits now.

A month later a vision-phone circuit between Chicago and Los Angeles was unusable for ten minutes. The same meaningless picture-pattern and the same preposterous noises came on and monopolized the line. It ceased when a repeater-tube went out and a parallel circuit took over. Again, frantic agitation displayed by high authority.

Then the interference began to appear more frequently, though still capriciously. Once a Presidential broadcast was confused by interference apparently originating in the White House, and again a three-way top-secret conference between the commanding officers of three military departments ceased when the unhuman-sounding noises and the scrambled picture pattern inserted itself into the closed-circuit discussion. The conference broke up amid consternation. For one reason, military circuits were supposed to be interference-proof. For another, it appeared that if interference could be spotted to this circuit or this receiver it was likely this circuit or that receiver could be tapped.

For a third reason, the

broadcasts were dynamite. As received, they were badly scrambled, but they could be straightened out. Even the first one, from Osceola, was cleaned up and understood. Enough so to make top authority tear its hair and allow only fully-cleared scientific consultants in on the thing.

The content of the broadcasts was kept considerably more secret than the existence of Mahon units and what they could do. And Mahon units were brand-new, then, and being worked with only at one research installation in the United States.

The broadcasts were not so closely confined. The same wriggly patterns and alien noises were picked up in Montevideo, in Australia, in Panama City, and in grimly embattled England. All the newspapers discussed them without ever suspecting that they had been translated into plain speech. They were featured as freak news—and each new account mentioned that the broadcast reception had ended with a break-down of the receiving apparatus.

Guarded messages passed among the high authorities of the nations that picked up the stuff. A cautious inquiry went even to the Compubs.

The Union of Communist Republics answered characteristically. It asked a question about Mahon units. There were rumors, it said, about a new principle of machine-control lately developed in the United States. It was said that machines equipped with the new units did not wear out, that they exercised seeming intelligence at their tasks, and that they promised to end the enormous drain on natural resources caused by the wearing-out and using-up of standard-type machinery.

The Compub Information Office offered to trade data on the broadcasts for data about the new Mahon-modified machines. It hinted at extremely important revelations it could make.

The rest of the world deduced astutely that the Compubs were scared, too. And they were correct.

Then, quite suddenly, a break came. All previous broadcast receptions had ended with the break-down of the receiving instrument. Now a communicator named Betsy, modified in the Mahon manner and at work in the research installation working with Mahon-modified devices, began to pick up the broadcasts consistently, keeping

each one on its screen until it ended.

Day after day, at highly irregular intervals, Betsy's screen lighted up and showed the weird patterns, and her loudspeakers emitted the peepings and chirps and deep-bass hootings of the broadcasts. And the high brass went into a dither to end all dithers as tapes of the received material reached the Pentagon and were translated into intelligible speech and pictures.

This was when Metech Sergeant Bellews, in charge of the Rehab Shop at Research Installation 83, came into the affair. Specifically, he entered the picture when a young second lieutenant came to the shop to fetch him to Communications Center in that post.

The lieutenant was young and tall and very military. Sergeant Bellews was not. So he snorted, upon receipt of the message. He was at work on a vacuum cleaner at the moment—a Mahon-modified machine with a flickering yellow standby light that wavered between brightness and dimness with much more than appropriate frequency. The Rehabilitation Shop was where Mahon-modified machines were brought back to

usefulness when somebody messed them up. Two or three machines—an electric ironer, for one—operated slowly and hesitantly. That was occupational therapy. A washing-machine churned briskly, which was convalescence. Others, ranging from fire-control computers to teletypes and automatic lathes, simply waited with their standby lights flickering meditatively according to the manner and custom of Mahon-modified machines. They were ready for duty again.

The young lieutenant was politely urgent.

"But I been there!" protested Sergeant Bellews. "I checked! It's a communicator I named Betsy. She's all right! She's been mishandled by the kinda halfwits Communications has around, but she's a good, well-balanced, experienced machine. If she's turning out broadcasts, it's because they're comin' in! She's all right!"

"I know," said the young lieutenant soothingly. His uniform and his manners were beautiful to behold. "But the Colonel wants you there for a conference."

"I got a communicator in the shop here," said Sergeant Bellews suspiciously. "Why don't he call me?"

"Because he wants to try some new adjustments on—ah—Betsy, Sergeant. You have a way with Mahon machines. They'll do things for you they won't do for anybody else."

Sergeant Bellews snorted again. He knew he was being buttered up, but he'd asked for it. He even insisted on it, for the glory of the Metallurgical Technicians' Corps. The big brass tended to regard Metechs as in some fashion successors to the long-vanished veterinary surgeons of the Farriers' Corps, when horses were a part of the armed forces. Mahon-modified machines were new—very new—but the top brass naturally remembered everything faintly analogous and applied it all wrong. So Sergeant Bellews conducted a one-man campaign to establish the dignity of his profession.

But nobody without special Metech training ought to tinker with a Mahon-modified machine.

"If he's gonna fool with Betsy," said the Sergeant bitterly, "I guess I gotta go over an' boss the job."

He pressed a button on his work-table. The vacuum cleaner's standby light calmed down. The button provided soothing sub-threshold stim-

uli to the Mahon unit, not quite giving it the illusion of operating perfectly—if a Mahon unit could be said to be capable of illusion—but maintaining it in the rest condition which was the foundation of Mahon-unit operation, since a Mahon machine must never be turned off.

The lieutenant started out of the door. Sergeant Bellews followed at leisure. He painstakingly avoided ever walking the regulation two paces behind a commissioned officer. Either he walked side by side, chatting, or he walked alone. Wise officers let him get away with it.

Reaching, the open air a good twenty yards behind the lieutenant, he cocked an approving eye at a police-up unit at work on the lawn outside. Only a couple of weeks before, that unit had been in a bad way. It stopped and shivered when it encountered an unfamiliar object.

But now it rolled across the grass from one path-edge to another. When it reached the second path it stopped, briskly moved itself its own width sidewise, and rolled back. On the way it competently manicured the lawn. It picked up leaves, retrieved a stray cigarette-butt, and snapped up a

scrap of paper blown from somewhere. Its tactile units touched a new-planted shrub. It delicately circled the shrub and went on upon its proper course.

Once, where the grass grew taller than elsewhere, it stopped and whirred, trimming the growth back to regulation height. Then it went on about its business as before.

Sergeant Bellews felt a warm sensation. That was a good machine that had been in a bad way and he'd brought it back to normal, happy operation. The sergeant was pleased.

The lieutenant turned into the Communications building. Sergeant Bellews followed at leisure. A jeep went past him—one of the special jeeps being developed at this particular installation—and its driver was talking to someone in the back seat, but the jeep matter-of-factly turned out to avoid Sergeant Bellews. He glowed. He'd activated it. Another good machine, gathering sound experience day by day.

He went into the room where Betsy stood—the communicator which, alone among receiving devices in the whole world, picked up the enigmatic broadcasts consistently. Betsy was a standard Mark IV communicator, now care-

fully isolated from any aerial. She was surrounded by recording devices for vision and sound, and by the most sensitive and complicated instruments yet devised for the detection of short-wave radiation. Nothing had yet been detected reaching Betsy, but something must. No machine could originate what Betsy had been exhibiting on her screen and emitting from her speakers.

Sergeant Bellews tensed instantly. Betsy's standby light quivered hysterically from bright to dim and back again. The rate of quivering was fast. It was very nearly a sine-wave modulation of the light—and when a Mahon-modified machine goes into sine-wave flicker, it is the same as Cheyne-Stokes breathing in a human.

He plunged forward. He jerked open Betsy's adjustment-cover and fairly yelped his dismay. He reached in and swiftly completed corrective changes of amplification and scanning voltages. He balanced a capacity bridge. He soothed a saw-tooth resonator. He seemed to know by sheer intuition what was needed to be done.

After a moment or two the standby lamp wavered slowly from near-extinction to half-

brightness, and then to full brightness and back again. It was completely unrhythmic and very close to normal.

"Who done this?" demanded the sergeant furiously. "He had Betsy close to fatigue collapse! He'd ought to be court-martialed!"

He was too angry to notice the three civilians in the room with the colonel and the lieutenant who'd summoned him. The young officer looked uncomfortable, but the colonel said authoritatively:

"Never mind that, Sergeant. Your Betsy was receiving something. It wasn't clear. You had not reported, as ordered, so an attempt was made to clarify the signals."

"Okay, Colonel!" said Sergeant Bellews bitterly. "You got the right to spoil machines! But if you want them to work right you got to treat 'em right!"

"Just so," said the colonel. "Meanwhile—this is Doctor Howell, Doctor Graves, and Doctor Lecky. Sergeant Bellews, gentlemen. Sergeant, these are not MDs. They've been sent by the Pentagon to work on Betsy."

"Betsy don't need workin' on!" said Sergeant Bellews belligerently. "She's a good, reliable, experienced machine!

If she's handled right, she'll do better work than any machine I know!"

"Granted," said the colonel. "She's doing work now that no other machine seems able to do—drawing scrambled broadcasts from somewhere that can only be guessed at. They've been unscrambled and these gentlemen have come to get the data on Betsy. I'm sure you'll cooperate."

"What kinda data do they want?" demanded Bellews. "I can answer most questions about Betsy!"

"Which," the colonel told him, "is why I sent for you. These gentlemen have the top scientific brains in the country, Sergeant. Answer their questions about Betsy and I think some very high brass will be grateful."

"By the way, it is ordered that from now on no one is to refer to Betsy or any work on these broadcasts, over any type of electronic communication. No telephone, no communicator, no teletype, no radio, no form of communication except *viva voce*. And that means you talking to somebody else, Sergeant, with no microphone around. Understand? And from now on you will not talk about anything at all except to these gentlemen and to me."

Sergeant Bellews said incredulously:

"Suppose I got to talk to somebody in the Rehab Shop. Do I signal with my ears and fingers?"

"You don't talk," said the colonel flatly. "Not at all."

Sergeant Bellews shook his head sadly. He regarded the colonel with such reproach that the colonel stiffened. But Sergeant Bellews had a gift for machinery. He had what amounted to genius for handling Mahon-modified devices. So long as no more competent men turned up, he was apt to get away with more than average.

The colonel frowned and went out of the room. The tall young lieutenant followed him faithfully. The sergeant regarded the three scientists with the suspicious air he displayed to everyone not connected with Mahon units in some fashion.

"Well?" he said with marked reserve. "What can I tell you first?"

Lecky was the smallest of the three scientists. He said ingratiatingly, with the faintest possible accent in his speech:

"The nicest thing you could do for us, Sergeant, would be to show us that this—Betsy, is it?—with other machines

before her, has developed a contagious machine insanity. It would frighten me to learn that machines can go mad, but I would prefer it to other explanations for the messages she gives."

"Betsy can't go crazy," said Bellews with finality. "She's Mahon-controlled, but she hasn't got what it takes to go crazy. A Mahon unit fixes a machine so it can loaf and be a permanent dynamic system that can keep acquired habits of operatin'. It can take train-in'. It can get to be experienced. It can learn the tricks of its trade, so to speak. But it can't go crazy!"

"Too bad!" said Lecky. He added persuasively: "But a machine can lie, Sergeant? Would that be possible?"

Sergeant Bellews snorted in denial.

"The broadcasts," said Lecky mildly, "claim a remarkable reason for certainty about an extremely grave danger which is almost upon the world. If it's the truth, Sergeant, it is appalling. If it is a lie, it may be more appalling. The Joint Chiefs of Staff take it very seriously, in any case. They—"

"I got cold shivers," said Sergeant Bellews with irony. "I'm all wrought up. Huh!

The big brass gets the yellin' yollups every so often anyhow. Listen to them, and nothin' happens except it's top priority top secret extra crash emergency! What do you want to know about Betsy?"

There was a sudden squealing sound from the communicator on which all the extra recording devices were focused. Betsy's screen lighted up. Peculiarly curved patterns appeared on it. They shifted and changed. Noises came from her speaker. They were completely unearthly. Now they were shrill past belief, and then they were chopped into very small bits of sound, and again they were deepest bass, when each separate note seemed to last for seconds.

"You might," said Lecky calmly, "tell us from where your Betsy gets the signal she reports in this fashion."

There were whirrings as recorders trained upon Betsy captured every flickering of her screen and every peeping noise or deep-toned rumble. The screen-pattern changed with the sound, but it was not linked to it. It was a completely abnormal reception. It was uncanny. It was somehow horrible because so completely remote from any sort of human communication in the year 1972.

The three scientists watched with worried eyes. A communicator, even with a Mahon unit in it, could not originate a pattern like this! And this was not conceivably a distortion of anything transmitted in any normal manner in the United States of America, or the Union of Compubs, or any of the precariously surviving small nations not associated with either colossus.

"This is a repeat broadcast!" said one of the three men suddenly. It was Howell, the heavy-set man. "I remember it. I saw it projected—like this, and then unscrambled. I think it's the one where the social system's described—so we can have practice at trying to understand. Remember?"

Lecky said, as if the matter had been thrashed out often before:

"I do not believe what it says, Howell! You know that I do not believe it! I will not accept the theory that this broadcast comes from the future!"

The broadcast stopped. It stopped dead. Betsy's screen went blank. Her wildly fluctuating standby light slowed gradually to a nearly normal rate of flicker.

"That's not a theory," said Howell dourly. "It's a state-

ment in the broadcast. We saw the first transmission of this from the tape at the Pentagon. Then we saw it with the high-pitched parts slowed down and the deep-bass stuff speeded up. Then it was a human voice giving data on the scanning pattern and then rather drearily repeating that history said that intertemporal communication began with broadcasts sent back from 2180 to 1972. It said the establishment of two-way communication was very difficult and read from a script about social history, to give us practice in unscrambling it. It's not a theory to say the stuff originates in the future. It's a statement."

"Then it is a lie," said Lecky, very earnestly. "Truly, Howell, it is a lie!"

"Then where does the broadcast come from?" demanded Howell. "Some say it's a Compub trick. But if they were true they'd hide it for use to produce chaos in a sneak attack. The only other theory—"

Graves, the man with the short moustache, said jerkily:

"No, Howell! It is not an extra-terrestrial creature pretending to be a man of our own human future. One could not sleep well with such an

idea in his head. If some non-human monster could do this—"

"I do not sleep at all," said Lecky simply. "Because it says that two-way communication is to come. I can listen to these broadcasts tranquilly, but I cannot bear the thought of answering them. That seems to me madness!"

Sergeant Bellews said approvingly:

"You got something there! Yes, sir! Did you notice how Betsy's standby light was wabbling while she was bringin' in that broadcast? If she could sweat, she'd've been sweating!"

Lecky turned his head to stare at the sergeant.

"Machines," said Bellews profoundly, "act according to the golden rule. They do unto you as they would have you do unto them. You treat a machine right and it treats you right. You treat it wrong and it busts itself—still tryin' to treat you right. See?"

Lecky blinked.

"I do not quite see how it applies," he said mildly.

"Betsy's an old, experienced machine," said the sergeant. "A signal that makes her sweat like that has got something wrong about it. Any ordinary machine 'ud break down handlin' it."

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THE SMART ONES

By JACK SHARKEY

Illustrated by SCHELLING





THE first inkling came in a news bulletin that interrupted all regularly scheduled programming on the networks. Russia had uttered a flat or-else at the UN assembly, and the U.S. had countered with a steely just-try-it. That was all. It might be bad, it might not be so bad. Par-for-the-course or This-is-it. The bulletin lasted forty seconds, then regular programming was resumed. No warnings, no repeats of the Conelrad band-numbers, no stay-tuned urgings. Just the bulletin, then resumption of routine telecasts.

Pete Crolin turned to his wife, Beth. "What do you think?" he said, not having to specify his meaning further. A faint frown deepened the soft lines of her forehead.

"I don't know," she said, thoughtfully. "I think I'll call Lucille, see what she and Corey think."

Her husband nodded, then lifted his beer and sipped it slowly, savoring the taste as though he might not have the chance again, his eyes returning to—but no longer witnessing—the western which the bulletin had interrupted. Beth rose from her chair, smoothed her dress, then made her way to the phone. Lucille's was a number Beth called at least once every day, but she had to look it up after dialling two wrong numbers.

"Corey thinks so, too," her friend said, when Beth had told the reason for her call. "He's out checking the shelter. We've got plenty of water and food, but he thinks we need more books, just in case."

"I wonder why we think this is it," Beth mused. "We both felt it, and I guess you and Corey did, too. It's like that last straw on the camel's back. That kind of feeling."

Lucille, however, was in no mood for philosophizing. "Corey's coming in, honey. I've got to help him with the books. I'll call back later—" She gave a funny, short laugh. "If there is a later." Lucille hung up.

PETE had finished his beer, and was standing beside the silent TV, staring at the wall, when she returned. Beth took him by the arm, and he turned to face in her direction without resistance. "Pete," she said, then louder, "Pete!" Some of the far-awayness cleared from his eyes, and he saw her.

"Oh. What'd Lucille have to say?"

Beth gave a funny kind of smile and a half-shrug.

Pete nodded. "Them, too. I guess I knew they'd feel it. Everybody will. I wonder how long we've got."

His wife gripped his upper arms, hard. "Listen," she said.

"It's not too late, yet. Lucille and Corey have told us a dozen times to come in with them if things started blowing up. There's room. I have plenty of food, so we won't infringe on theirs. Let's go over there, now. Just— Just in case."

Pete wrenched away from her and shook his head violently. "No! I've told you, over and over. I'm not going to prolong things. If the world blows itself up, I don't want to hang around for a few extra weeks to die in the wreckage of thirst or starvation. I'd as soon go when the world goes." Then his manner softened, and he took her gently by the shoulders. "But, honey— If *you* want to go with them, it's okay. I'll understand. Let me help you pack the car, and—"

Beth's hand came up in a blurred arc and cracked stingingly against the side of Pete's face. "Stop it!" she cried. "Stop talking that way! You know I won't go without you. What's left if your gone!?" Pete had to grip her wrists to stop the frantic tiny fists that pummeled his chest in angry affection.

"Okay, okay, honey. I won't say it again. We'll stay here, together." He started to take her in his arms, then suddenly grinned and started turning her around to face the other way. "In fact, we'll have a party!" he

said, shoving her kitchenward. "Open that bottle of wine we've been saving for Thanksgiving dinner. We'll have it, tonight, along with maybe some of that anchovy paste we bought and never tried, and—"

"There's some cold chicken in the refrigerator," said his wife, catching his infectuous enthusiasm. "And I think some onion dip, and corn crisps—"

The peal of the front doorbell stopped them in the hall. "Lucille?" Pete asked his wife. Blankly, she shrugged, then crossed the short foyer and opened the door. A young man in uniform burst in, his cap pushed crazily back on his short-cropped hair. "Pete— Beth— Listen!" he said. "Did you hear the news bulletin?"

"Martin . . ." Pete said, shaken. "Why aren't you at the base?" Martin Fenelly was a neighbor, a Space Reservist.

"Dorothea's out in the car. We're headed there now. Come with us, please!" begged the young officer.

"Something is going to happen, then!" said Beth.

"You bet your boots," said Martin. "Riots are starting all over the world. London, Chicago, Cairo . . . Anyplace with public shelters. People are trampling one another to get in."

"But the newscasters didn't say—" started Pete, simultane-

ously with Beth's halting, "Conelrad isn't on the air . . ."

"Conelrad!" spat young Fenelly. "They don't dare use it. If they did, the panics would grow. Right now, there's still a chance of keeping some order. One warning to the populace, and the country becomes a mob, two hundred million strong!"

"Pete—!" Beth turned to stare up into his face. "What should we do?"

Pete licked dry lips, then looked shrewdly at Fenelly. "What's at the base? Shelters?"

"A ship," said Martin. "A spaceship. Never been tried, or fully tested, but it's about the only real chance anyone has. I'm going, so's Dorothea, and three of my crewmen. The others are swiping jets to fly to their homes. They want to be with their families when hell breaks loose."

"But where's it flying to? Where can you go?"

"Moonbase," said Martin. "There's plenty of room, all the synthetic foods a person needs, oxygen-generators, water-recapturing systems. It's the nearest safe spot, as of that blowup at the UN today."

BETH turned a hopeful gaze to Pete. "Should we, darling? It's not like a shelter, like you were worried about. We don't have to come out and look for

food in the rubble. We can live indefinitely on Moonbase. Please, darling! Please?"

"I've got to think," said Pete, blinking. "It never occurred to me I'd have a third choice. I was resigned to sitting and waiting for the blast. Now— I'm all mixed up."

"It's life Martin's offering us!" pleaded Beth. "You can't turn down an offer of life, real survival!"

"But— But is it?!" asked Pete, uncertainly. "We can't leave Moonbase any more than we could leave Corey's shelter. What difference if we're buried alive to avoid radiation or freezing vacuum?"

"Pete, please!" said Beth, almost screaming.

"Damn it, Pete, make up your mind!" snapped Martin. "I can't wait another minute. My wife's out in the car; she's trusting me to take her to safety!"

"I— I won't go! Maybe I'm wrong, but I just don't want to leave. If I had time to think—"

"All right!" said Martin, starting for the door, angrily. "Try to do a favor, risk your own life, and—" Then he relented and rushed back to his neighbor. "Good luck, Pete," he said, gripping the older man's hand tightly. "Goodbye, Beth."

"No! No, wait!" said Beth Crolin, not daring to look at her husband's face as she rushed

after the young man. "I'll come with you!" Pete just stood like carved stone, watching, as Beth hurried down the front path into the night toward the waiting car. Martin, sick with embarrassment, turned a wryly apologetic grin Pete's way before following after her.

When the sound of the engine faded in the distance, Pete finally managed to move, and closed the door on the cold night outside. He went to the kitchen, stared hard at the bottle of wine in its corner of the pantry shelf, then yanked it down and smashed it to glittering bits in the sink.

* * *

"Corey," complained Lucille, "you *know* you're not going to read *Vanity Fair* or *Coningsby*. You've started them a hundred times, and always lost interest. We could use the space for a hundred better things."

Corey shoved the books doggedly back into the slot from which his wife had taken them on the bookshelf, and set his back stubbornly against them, glaring at her. "Those are records," he said, fighting an urge to shout. "The society of Thackeray's time, the British school system of Disraeli's. Some day our children will want to know what the world was like before the disaster."

"Why?" said his wife. "What they don't know won't hurt them. They'll never wonder about it if you don't prod them to. And why should they know about *Vanity Fair* and *Coningsby* anyhow? You've survived this long without knowing!"

"All right, all right!" snarled Corey, whirling to the shelf, and pulling books out by the handful. "Fill the space with Wheaties, or movie magazines! Or home permanents and lipstick! To hell with our children's minds!"

"Corey, stop it!" hollered Lucille, trying to pick the books from the shelter floor as he hurled them there, then giving up and simply trying to pin his flailing arms. His elbow struck her in the chest, and she fell back with a startled grunt. Corey, his face white, started toward her with words of remorse on his lips, then tripped ingloriously upon the heaped volumes and sprawled on his face at her feet.

Lucille sank into a chair as he rose groggily on hands and knees, and began to laugh. Corey, after a second, began to match her laughter with his own. Then he frowned and stopped. Her laughter was all wrong. He took her by the shoulders and shook her, but she kept on laughing while the tears ran down her contorted face.

YOU should have told me!" moaned Martin, on his knees beside the metal-and-nylon cot. Dorothea just groaned and tossed her head from side to side on the sweat-soaked pillow, fighting the restraining straps. "S— Surprise," she mumbled, her features white with agony. "I w-wanted it to be a surprise."

"But—" her husband sobbed, beating his fists futilely against the steel bulkhead, "didn't you know the takeoff would be like that? Haven't I told you how many grown men had died of internal hemorrhages from the gravities they had to resist during takeoff? Didn't you suspect that you—!?"

He stopped, and sagged, his head resting against the frame of her bunk, and just sobbed softly, uselessly, while his wife murmured, over and over, like a fragment of intolerably sad music, "My baby, my little baby, my poor baby . . ."

* * *

Pete sat in a thick, muddling fog, his fingers fumbling with paper and glue, sniffing softly in his misery. He didn't hear the light footsteps on the porch, nor the familiar voice, until his name was called for the third time. Then he started, guiltily, and began to try and hide what he held clumsily on his lap.

Beth came into their bedroom

and saw him, and what he was trying to do. The empty beer cans, the shattered glass upon the carpeted floor, and the ragged tear in the wallpaper between bureau and closet told her what he'd done. "I don't blame you," she said softly, cupping her hand gently about the back of his neck. Pete suddenly choked on his tears and flung his arms about her thighs, burying his face hard against her abdomen.

"I was so mad— so mad at you," he said between spasms of relieved weeping. "I came up here, drinking, saw the wedding picture on the wall— s-smashed the glass, and—"

Beth looked at the wedding photo where it had fallen in two curling halves upon the floor, and smiled. "But you tried to fix it again," she said softly.

"Of course I tried to fix it!" he muttered, keeping his face close against the warm softness of her belly. "I got mad, but I got over it."

"Me, too," said Beth. "A mile from the house, I screamed for Martin to let me out of the car. I had to walk back. No one's bothering to run the busses anymore. I— I saw the wine, in the sink. Is there any beer left?"

He nodded, mutely, still holding her tightly.

"Then we can still have our party," she said decisively.

"Maybe not so fancy as we'd planned, but—"

Then her husband was surging to his feet and stilling her lips with the hungry pressure of his own.

HOURS before the spaceship reached Moonbase, the men stationed there saw the horror begin. The orb of Earth, silver and blue against the black void of space, began to erupt with tiny bubbles of orange-and-white, faster and faster, until the shapes of the continents were limned against the steady blue glow of the oceans. Then the fringe of the oceans began to billow white rolling clouds of steam, and the planet shrouded itself in impenetrable heaving seas of angry white vapor.

Some common tacit urging made the men continue with their jobs there, go through the routine of scanning the universe, radioing reports to stations long since molten piles of slag, metering the water and precious oxygen that kept them alive. No one wanted to talk of what they'd seen; life went on for many hours as though nothing untoward had happened. Then, when the last strained thread of control was fraying madly—

The spaceship landed, with its five-person complement.

"More mouths to feed," said

the Moonbase commander, looking out through the port at the spacesuited figures moving clumsily toward the airlock. "I don't know if we should let them in. Even if it's the President, I don't know."

"Sir," said an aide, "Look there, in the lead. The small one, leaning on the arm of another one. I think it's a woman."

The commander's eyes hooded for a moment, then he turned to his aide and said, "Let her in."

"Before the others, you mean, sir?" asked the man.

"Let her in. Period."

"S-sir . . ." said the aide, his voice shaking. "You're not thinking of—"

"We've been here for three months without a woman, Captain," said the commander. "This may be the last one alive in the cosmos. I'm not sure the man with her would agree to sharing her."

"But the others—They can't live out there for more than a few hours in their spacesuits . . ."

But the commander had picked up a book of crossword puzzles, and was concentrating fiercely on a cryptogram. The other man swallowed noisily, once, then went to carry out the orders.

* * *

"It's over," said Corey to his wife. Lucille nodded dully.

"Don't you understand, honey? The bombing's stopped, and we're still alive. Enough food for months. The radiation-count will be down by then, and—"

"And what?" asked Lucille, staring from her husband's face to the two children sleeping on the military cot before the crowded bookshelf. "When it's down, what happens next?"

"Why— We go out. We rebuild."

"Rebuild? Rebuild what? How?" said Lucille. "Can you build a radio? If you could, who would we talk to, listen to?"

"I mean, rebuild houses, start farming, raise animals . . ."

"Will the land grow food any more? Are there animals left out there, or did they forget to burrow underground when the fires began?" said Lucille.

"Be reasonable, honey!" said Corey.

"That's what I'm being, for the first time in years," she said. "I wish we'd stayed with Pete and Beth."

"They've turned to ashes by now," said Corey.

Lucille shrugged. "Maybe they're better off." The baby began to cry, and kick its round pink legs.

"I think the baby needs a change, or something," said Corey, looking down at his infant son.

"Read him *Coningsby*," said

Lucille. Then she started laughing again, until Corey was forced to slap her face crimson to quiet her.

JUST a few weeks short of two years after the holocaust, the great spaceship settled on faltering fires to the charred surface of the Earth. The Moonbase commander, gaunt from long starvation, reeled out into the glaring white sunlight, fell face downward upon the sharp black rocks, and just lay there, trying to catch his breath. Behind him, a pale shadow formed in the blackness of the open airlock, and a woman crept out, her hair tangled and white-streaked, her face raddled with disease. She shuddered, and sank to a squatting position on the ground, covering her face with her hands to block out the horrible vista that ran for mile upon scorched mile.

"It's dead, the world's dead," she mewled, quaking. "We're at a wake, a hideous, horrible wake!"

The commander groaned and lifted himself up painfully on his elbows. "There's got to be something, somewhere, or we've had it."

"It's your fault," said the woman. "What did you expect the men to do when you kept me to yourself! You shared me with them nearly two years. You shouldn't have locked the men out of your quarters."

"I was drunk!" the commander said bitterly. "I didn't think they'd go berserk—wreck the synthesizers—fight among themselves—"

"I had a husband, once," said the woman. "You let him freeze to death, suffocate, all because he would have wanted to keep me for himself. You turned around and did the same thing." Musingly, she eyed a large jagged stone, lifted it in her hand, and approached the weary, sprawling form on the ground. "If he deserved to die, why not you?"

"That was different," said the commander. "I'd have shared you when I sobered up. He'd never—" He hadn't time for even a gasp as the woman brought the stone down with both hands upon the nape of his neck, shattering the bone beneath the thin flesh there. He fell forward, drooling blood on the sun-baked black rock.

"No," said the woman, brushing her hands firmly against her thighs to cleanse them of the feel of the rock. "Martin would never. That's why I loved him."

Tiredly, she began to walk, away from the ship and the memories of degradation it held for her, out across the hot, blazing plains of arid rock, humming a lilting waltz that had been played at her highschool prom.

When she could walk no further, she lay down on the rock, rolled onto her back, and smiled emptily at the stark blue skies overhead until unconsciousness stole over her.

A HUNDRED miles away, a naked boy knelt before a cairn of rock, frowning in concentration, his tongue tucked against the corner of his mouth as he carefully arranged smooth red pebbles before the cairn until their design pleased him. Under the cairn lay a steel-and-concrete door, and within the chamber beyond it lay the mummified bodies of his parents and siblings, as he'd found them when he was old enough to crawl. He was walking now, pretty well for his fifteen months of life. He could only judge his progress by the progress of others like him, children conceived amid the radiation and gene-mutating chaos of those first months in the shelters.

He'd determined to be a leader. He didn't know the word "leader", of course, but he would soon coin a sound that conveyed that meaning to himself and the others. He didn't know why his parents were dead, or the parents of the others like himself. Perhaps one always died when one reached a certain age. Still, why had his brother and sister died, then, since they had so

much growing to do before they matched that of his parents?

He shrugged away the problem, finished his arrangement of colored stones, and stood up to consider them. They would do nicely, he decided. They would prettify the spot where his ancestry lay buried, here amid the rocky splendors of such a lovely, incredibly beautiful planet.

He scowled, suddenly, deciding that the pattern of stones held one red rock too many. Carefully, he removed it.

He sent a short series of affectionate thoughts toward the departed souls of his family, then turned away from the cairn and began to toddle across the burning black rock toward the area housing the shelters of the other children. He was tired of mourning for the day. Besides, the other kids were considering building a structure to keep off the infrequent hot rains, and he thought he knew a way to support the roof which no one else had yet considered.

Thinking hard as he moved toward the community area, he tossed the colored pebble up and down absently in one hand, then popped it into his mouth and chewed it up with relish. It was only an appetizer. For dinner, at sunset, he had his eye on a rainbow outcropping of quartz. It should be delicious.

THE END

SAVAGE WIND

By HARLAN ELLISON

If you came as an invader to a far planet and found menace in the forest—in the air around you—what seemed like brooding hatred in all the quiet places—would you expect also to find mercy and brotherhood? Neither did the invaders.

WUMMEL, the Ruskind, saw the shining thing come down. He watched it from the stand of gnarlbushes as the pointed thing flamed across the sky, streaking toward the red sun. It flashed brightly above the land, and disappeared quickly.

Wummel's pointed face quivered, and his split tongue slipped in and out of his mouth nervously. It had not been a bird, *that* was obvious. Nor a beast of the land. Whatever it had been, it stirred a strange sensation within him.

As though he were seeing a long-missing brother returning from across the mountain passes, coming home, after a long, long absence. But that could not be:

this metal thing he had never seen before. Yet he could not banish the feeling.

Wummel, for the first time in a life filled with fears, was terribly frightened.

He crouched down, his triply-jointed legs crossing under him. He watched the sky. If the flaming thing was to make another appearance, he would not be caught by surprise.

The sun had slipped across the pale blotch of gray sky, when the thing appeared again. It dipped as it approached the forest, and banked down toward the yellow-feathertops of the trees. In a few moments Wummel saw the falling thing push its sharp beak into the trees,



The forest seemed to know—to understand.

and disappear through the foliage.

A muted roaring came, and a ropy pillar of angry smoke twisted up into the sky. The roaring grew in violence, then suddenly ceased. The semi-silence of the forest dropped down again, as though it had never been shattered.

The *swip-swip-swip* of the forest crickets resumed. The cough and growl of the land-beasts took up where it had died. A yellow-striped prow-cat slipped through the trees at the edge of the clearing. The wind whistled softly in among the yellow feather-leaves. The forest looked as it had always looked.

Only Wummel, of all the Ruskind, knew the thing had come, knew the forest was not as it had always been.

And he turned and scuttled off on digger fingers and triple-jointed legs to tell the Ruskind. He might have sent the message by thought to the One, who would have told the Ruskind. But somehow—this message had to be delivered personally. He moved through the undergrowth.

And in the forest, there was movement from the thing that had ceased to flame.

Captain Kovasic issued commands. "Sellers, send your crew into that section over there. See if you can find any sign of the creatures who built that village. Galen, take the flitter and see if those mountains are inhabited. Let's make this thorough, men. It's the last one before home."

He fitted the picture of a spaceman. Tall, bronzed from many suns; wide, blocky hands, altogether able hands that commanded. Eyes blue as the seas over which he had flown, a mouth that spoke sharply. A man with lines of character in his face; a man never beaten, searching for an ideal.

"This survey has to be *really* good, Charlie," the Captain said to his First. "They're kicking back home about the appropriations for the Mapping Command. They may swallow us into the mercantile guild systems. That wouldn't be good."

The First Mate said, "We'll make it Vern." Then, "You look tired, Vern. Catch any sleep during the last leg?"

The Captain shook his head. "You know me. 'No-Wink, No-Blink, No-Nod Kovasic' they called me at the Academy." Then he sobered.

"Bring something back, Charlie; something to open their eyes back home; to make them understand we're not just flitting around the galaxy. We have to keep the Command in business. It was thirty years coming. Be a hell of a note to lose it, now."

The eyes watching the strange ones were huge, platter-like organs without lids. They watched unblinking as the strangers from the flaming thing tromped through the forest.

They were going to the village.

The thought went out from the One, to the other Ruskind, *Be careful, my children. They seem to bode no harm, but they are not of Ruska, they are not the Ruskind; not of the land, nor of the sea, nor of the air we know. Be careful.*

Wummel heard the warning thought, and hunkered deeper under the spread roots of the gnarl-bush. Yet . . . there was something about these strange erect wanderers that drew him.

Is it because I saw them first? he wondered. Or is it something else. I feel—I sense—a deeper bond in these strange ones. They are not wholly unknown to me.

He reached out daintily, searching with his mind, plucking delicately as though on some fragile musical instrument.

A stirring of buried racial memory. A common germ, a flame, a whirling nebula and a throwing-out of flashing arms. One parent. One world, so far back even the concept had been drowned by memory on memory. Much had been learned in that time.

His eager eyes caught the every flicker of their bodies, the every tread of their step, the every thought of their minds. They were strange beings indeed. Their minds were never at rest. They could not send silent thoughts and they seemed to struggle in the cages of their bodies to communicate.

Occasionally one would move its mouth at the other, and a fraction of the real communication would be understood.

There was a wandering in them. They were never at rest. Their lives were meshes of step and run and scamper. Never at peace, never at rest, always driven on, always driven on . . .

Father, the thought blossomed. I want to follow them, I want to listen more to them.

Thought returned: *Be careful, my son.*

They captured him in the village. They had been studying the thatchy hutches, when the First Mate caught the movement of his green fur from the corner of his eye. They had closed in carefully. Wummel scampered away, but the enmeshing action of the power-driven elasticord in their guns trapped him.

He lay still, as they picked him up, wrapped into a small furry ball, with the adhesive elasticord wound about him in many twistings. They carried him out of the forest, and laid him before the First Mate.

He lay still as they surrounded him. He stared up out of saucer-sized yellow eyes, and the green smooth fur of his flanks quivered under their gaze.

"Is it animal, vegetable, or . . ." one of the non-coms began, but the First Mate cut him off with a wave of the hand.

"Do you feel anything?"

The others shook their heads, but the First noticed one man whose eyes had clouded, whose brow was furrowed with lines of concentration. As though he were

listening for a sound, far off.

"Queer lookin' little thing," one of the men said. "Wonder what it eats. Or if *we* can eat *it*!" He began to chuckle.

The First cut him off hard.

"Shut up!" His face had an odd shine to it, as though a thin film of perspiration was about to break through.

"I—I—" the words only half-formed.

He knew what he wanted to say, but he could not. The thing before him was a beast of the woods; a dumb thing with neither mind nor manner. Still, he felt it was *speaking to him*.

Strange words with a strange tone. Words and thoughts of a million years. The thoughts of an entire race; a race that had never left its world, had never climbed from the dirt, and yet was sublimely happy. Tied to its world; at peace with the universe.

The First Mate had been in space eighteen years. He had grown hard fighting for the Mapping Command, and it had been many more years than he could remember since he had cried.

But he felt the tears beginning. The thoughts were so sweet, so clear, so demanding in their picturing.

"Take him to the ship," he

said, turning toward the forest. "We'll let the Captain have a look at him."

The men lifted Wummel and carried him back through the foliage.

The First Mate followed a few feet behind, his head lowered.

They wanted to take Wummel to Earth.

He could hear them saying it in the caverns of their minds. The thought came strongest from the man they called the Captain. He thought, and the thoughts came to Wummel, and Wummel listened.

To Earth the thought said. To Earth, and the Command is saved. To Earth and then we can go off across the Rim and find the last planet ever.

Wummel knew these were lower thoughts; buried deeper than the fibers knew. Buried down where this Captain could never really see them, only feel the burning of their message. And he always moved without rest.

Constantly driven on, with no sleep, toward no ending. Wummel felt the heart in him go out to these strange beasts of the eternally nighted sky. They were terrible in their everlasting wandering. Even their home world

was to them merely a base to which they could return.

Now they wanted to take him from *his* home.

Wummel considered it, the chill spreading up from his feet. He knew he was as deeply rooted to Ruska as the sewlan or the gnarl-bushes. Could it be conceivable that he might go, and never return?

Wummel found it difficult to live in his world. The land-beasts were huge, hungry and fearsome. The prowl-cats and the sytazill were always on the hunt, and Wummel's people had never quite learned to avoid them. For the land-beasts were not precisely ignorant brutes. They had minds, and souls, and their actions could not always be predicted.

Then, too, there was the sucking valley, where the mud ran up over the walls of the canyon and dragged down those unlucky enough to be blown there during the Time of Winds. There were many things that made life hard for the Ruskind. But it was good, too.

It was good when the triple moons rose in blue and fire-red and white. When the coolness came. When the long magenta blossoms of the

aloo broke forth and shot many feet into the air, showing all the hills till they were carpeted bright and happy with the color. And most of all, Wummel loved the sighing, whispering, chortling winds that blew to him from beyond the mountains. He had often wanted to go there, beyond the stark black mountains, and see the Wind Lord who made the happy puffs that became the wind.

They wanted to take him from all that and send him hurtling through a black so deep that no man, no Ruskinda, would ever see to its far end.

He knew of the stars. He had seen them. His people spoke of them. But not to go there. Never that!

They wanted to cast him from his home and set him wandering on that star-road that twisted and wound in among the eternal graves of the beings that had wandered to their deaths.

Tears, thick and oily, arose in Wummel's eyes, even as the Earthmen let the big plug-door sigh shut, blocking away the light of Ruska. He felt the shivering and roaring, the hungry urgency of the metal itself, as the ship thundered its desire to go.

Never to stop again on this world of the three moons of the blue, blue seas, of the razor-toothed mountains, and the winds blowing from beyond those mountains.

The take-off was a sloppy one. Somehow the tapes had been fed in with a bit too much urgency, as though the Drivemaster had wanted away from the tiny world.

Captain Kovasic stood with his back to the little cage; watching through the viewport as the multi-colored world dropped away under them; until it was a picture drawn on a blackboard.

He felt the thoughts bubbling up in him, and turned, reluctantly. He stared at the little green creature, huddled into a ball, its huge eyes staring. The creature was shivering, mocking the quivers of the ship itself. Kovasic felt that had the being possessed eyelids, it would surely have had them screwed tightly, painfully shut.

The thoughts roiled and swirled, like dirty oil on an angry sea, and he felt the rising of his own longing in his throat. A longing he had never actually known he possessed.

He knew, with a startling burst of clarity, the writing

in the Book of the Ancestors. He knew of the Ruskind and of the roots that grow deeper, far deeper, than the mere roots of race. He knew he was a wanderer, that all his people were wanderers, and how they would end. He knew, too, what he had done to Wummel.

He watched as the little creature's golden eyes frosted over as its fur ceased quivering.

The First Mate had not wanted to come to the bridge. He had known the creature was there, and he had not relished the ideas and disturbing thoughts the being seemed to create.

But he came, because he knew the progress report must be delivered. At all times the Captain must know how far they had come, how fast they were going, how soon they would arrive.

All the information of running.

When he stepped onto the bridge, he saw only the Captain's back, and the blind, blank face of the viewport. The Captain had blacked it out. Space was cut off for the first time since the ship had been launched.

"Captain . . . ?" His voice was a softness, as though the

fragile glass and spiderweb of the silence hanging between them might shatter.

"It died," Kovasic said, staring straight ahead into nowhere.

"Died? The specimen? How? What could have . . . ?"

"It couldn't live away from the planet. We broke its heart. It's that simple; laugh if you want—breaking its heart—but it died, that's all. And now we'll go home. Home." He said the last word with an odd, thick sound. As though it had been something he had known so very long ago but had forgotten. Now, suddenly, he had remembered it and knew he was damned because it was too late.

"The Command. It will be swallowed by the mercantile!"

The Captain whirled, his face half-angry, half-imploring. "Don't you understand, Charlie? Don't you know? You ran away from the creature, you must have heard what it said. Don't you see? The Command, the mercantile guilds, Earth, the searching, the always hungering for more, more, more, more . . ."

He stopped as though searching for words, then said the one thing that *did*

(cont. on page 115

A "JOHNNY MAYHEM"
ADVENTURE

THINK YOURSELF TO DEATH

By C. H. THAMES

WHEN he reached Ophiuchus, Johnny Mayhem was wearing the body of an elderly Sirian gentleman.

Nothing could have been more incongruous. The Sirian wore a pinc-nez, a dignified two-piece jumper in a charcoal color, sedate two-tone boots and a black string-tie.

The loiterers in the street near the Galactic Observer's building looked, and pointed, and laughed. Using the dignity of the dead Sirian, whose body he wore like other people wear clothing, Johnny Mayhem ignored them. They had a point, of course. It was hot and humid on Ophiuchus IX. The loiterers in the dusty, evil-smelling streets wore nothing but loin cloths.

Mayhem went inside the building, which was air-con-

If you've never read a Johnny Mayhem story before, you are in for a treat. Johnny, who wears different bodies the way ordinary people wear clothes, is one of the most fascinating series characters in science fiction.

ditioned. Probably it was the only air-conditioned structure on the entire planet. Mayhem dabbed at his Sirian forehead gratefully, mopping at sweat. As near as he could figure, his life expectancy in this body was down to three days, Earth style. He wondered fleetingly why the Galactic League had sent him here to Ophiuchus. He shrugged, knowing he would find out soon enough.

The Galactic Observer on Ophiuchus IX, a middle-aged Indian from Bombay named Kovandaswamy, wore an immaculate white linen loin cloth on his plump body and a relieved smile on his worried face when Mayhem entered his office. The two men shook hands.

"So you're Mayhem?" Ko-



The crazed mob was bent upon rapine and murder.

vandaswamy said in English. "They told me to expect you, sir. Pardon my staring, but I've never been face to face with a legend before. I'm impressed."

Mayhem laughed. "You'll get over it."

"Well, at least as a Sirian gentleman, you're not very prepossessing. That helps."

"It wasn't my idea. It never is."

"I know. I know that, sir." Kovandaswamy got up nervously from his desk and paced across the room. "Do you know anything about Ophiuchus IX, Mayhem?"

"Not much. It's one of the Forgotten Worlds, isn't it?"

"Precisely, sir. Ophiuchus IX is one of scores of interstellar worlds colonized in the first great outflux from Earth."

"You mean during the population pressure of the 24th century?"

"Exactly. Then Ophiuchus IX, like the other Forgotten Worlds, was all but forgotten. As you know, Mayhem, the first flux of colonization receded like a wave, inertia set in, and the so-called Forgotten Worlds became isolated from the rest of the galaxy for generations. Only in the past fifty years are we find-

ing them again, one by one. Ophiuchus IX is typical, isolated from the galaxy at large by a dust cloud that—"

"I know. I came through it."

"It was colonized originally with Indians from southern and eastern India, on Earth. That's why the Galactic League appointed me Observer. I'm an Indian. These people—well, they're what my people might have developed into if they'd lived for hundreds of years in perfect isolation."

"What's the trouble?"

Kovandaswamy answered with a question of his own. "You are aware of the Galactic League's chief aim?"

"Sure. To see that no out-world, however small or distant, is left in isolation. Is that what you mean?"

"Yes," agreed Kovandaswamy. "Their reason is obvious. For almost a thousand years now the human race has outpaced its social and moral development with development in the physical sciences. For almost a thousand years mankind has had the power to destroy itself. In isolation this is possible. With mutual interchange of ideas, it is extremely unlikely. Thus, in the interests of human survival, the Galactic

League tries to thwart isolated development. So far, the Forgotten Worlds have co-operated. But Ophiuchus IX is an exception."

"And the League wants me to find out why?"

"Precisely."

"How are they thwarting—"

Kovandaswamy was sweating despite the air-conditioning, despite his almost-naked state. "You have the right to turn this mission down, of course. The League told me that."

"I'm here," Mayhem said simply.

"Very well, sir. Sooner or later, every outworlder who ventures out among the Ophiuchans kills himself."

"I guess I didn't hear you. Did you say kills himself?"

"Suicide, Mayhem. Exactly."

"But how can you blame—"

"Like their ancestors from the Earthian sub-continent of India, Mayhem, the Ophiuchans are mystics. The trance, the holy man who sits in contemplation of his navel, the World Spirit—these are the things of their culture most important to them. Mayhem, did you ever see a hundred holy men of India working together?"

"Usually they don't work together."

"Precisely, sir. Precisely. Here on Ophiuchus, they do. And not merely a hundred. All of them. Virtually all of them. Working together, their minds in trance, unified, seeking their World Spirit, they can do amazing things."

"Like mentally forcing the outworlders to kill themselves?"

"Yes, sir. Legally, they are innocent. Morally, they do not recognize the outworlders as equals of themselves. The League wants to know what they are trying to hide. It could be a threat to peace and—existence."

"You have a body for me?" Johnny would be ready with that provided.

If anyone but Johnny Mayhem had asked that question, Kovandaswamy would not have known what he was talking about, or would have thought him insane, or both. But Johnny Mayhem was, of course, the legendary Man Without a Body. How many corporeal shells had he inhabited in the past half dozen years? He shrugged, not remembering. He couldn't remain in one body more than a month: it would mean the final death of his *elan*, his

bodiless sentience. So far he had avoided that death.

The Galactic League would help him if it could. Every world which had a human population and a Galactic League post, however small, must have a body in cold storage, waiting for Johnny Mayhem if his services were required. But no one knew exactly under what circumstances the Galactic League Council, operating from the hub of the Galaxy, might summon Mayhem. And only a very few people, including those at the Hub and the Galactic League Firstmen on civilized worlds and Observers on primitive worlds, knew the precise mechanism of Mayhem's coming. To others it was a weird mystery.

Johnny Mayhem, bodiless sentience. Mayhem—Johnny Marlow then—who had been chased from Earth, a pariah and a criminal, almost seven years ago, who had been mortally wounded on a wild planet deep within the Saggitarian Swarm, whose life had been saved—after a fashion—by the white magic of the planet. Mayhem, doomed now to possible immortality as a bodiless sentience, an *elan*, which could occupy and activate a fresh

corpse or one which had been frozen properly . . . an *elan* doomed to wander eternally because it could not remain in one body for more than a month without body and *elan* perishing. Mayhem, who had dedicated his strange, lonely life to the service of the Galactic League because a normal life and normal social relations were not possible for him. . . .

"Then you'll do it?" Kovandaswamy asked on Ophiuchus IX. "Even though you realize we can give you no official help not only because the Galactic League approves of your work unofficially but can't sanction it officially, but because an outworlder can't set his foot outside this building for long or off the spacefield without risking death. . . ."

"By suicide?"

"Yes. I'm practically a prisoner in Galactic League Headquarters, as is my staff. You see—"

"What about the body?"

Kovandaswamy looked at him nervously. "A native, Mayhem. A native won't be molested, you see."

"That figures. What kind of native?"

"In top shape, sir. Healthy, young, in the prime of life you might say."

"Then what's bothering you?"

"Nothing. Nothing, sir."

"Your technicians are ready?"

"Yes, sir. And vowed to secrecy."

Mayhem found a tiny capsule in the pocket of his Sirian jumper, and popped it in his mouth.

"What—what's that?" Kovandaswamy asked.

Mayhem swallowed. "Curare," he said.

"Curare! A poison!"

"Paralysis," said Mayhem quickly. "Muscular paralysis. You die because you stop breathing. Painless . . . and . . ."

"But—"

"Call your technicians . . . new body . . . ready . . ." Gasping, the Sirian gentleman, hardly Johnny Mayhem now, fell to the floor.

Trembling, Kovandaswamy pressed a button on his desk. A few moments later, two white-coated technicians entered the office.

"Project M," Kovandaswamy said.

Grimly the technicians went to work.

Mayhem awoke.

Ordinarily it was his *elan* alone which journeyed between the worlds, his *elan*

which was fed the information it would need in hypno-sleep while the frozen body was thawed out. Sometimes, however, he came the normal way in a body which still had some of its thirty days left, as he had come to Ophiuchus IX in the Sirian gentleman.

Darkness. The body felt young and healthy. Mayhem wondered vaguely how it had died, then decided it did not really matter. For the next thirty days the body would live again, as Johnny Mayhem.

Recessed lighting glowed at the juncture of walls and ceiling. Mayhem was reclining on a cot. A loin cloth and a large shawl had been laid out for him. On the far wall of the room was a tinted mirror. Mayhem got up and went over there.

What his new body looked like hardly mattered, he told himself. Youth, health, strength—these were important. He could sense them internally. He could . . .

He stared at the image in the mirror. His face turned beet red. He went for the shawl and the loin cloth and put them on. Cursing, he went to find Kovandaswamy.

"Is this supposed to be a joke?" Mayhem demanded.

"You never asked what

the—" Kovandaswamy began.

"How am I supposed to find out anything—like this?"

"It's a young body, a healthy body. It is also the one we were given when the Galactic League first came here. It is the only one we were given."

"Take it or leave it, eh?"

"I'm afraid so, Mayhem."

"All right. All right, I guess I shouldn't complain. It could probably outrun and outfight and outthink the dyspeptic old Sirian gentleman, and things turned out well enough on Sirius III. But it'll probably take most of my time just getting used to it, Kovandaswamy. I'm supposed to be conducting an investigation."

"At least as an Ophiuchan you won't arouse suspicion."

Mayhem nodded slowly, with reluctance. There was nothing else to say. He shook hands with Kovandaswamy and, wearing the loin cloth and the shawl, left the Galactic League building.

With, of course, a completely new identity.

Mayhem walked a mile and a half through hot, arid country. The League building was isolated, as if its inmates might contaminate the native Ophiuchans. Along

the dusty road Mayhem passed a *guru*, the name for a wise man or a holy man first in India and now here on Ophiuchus IX. The guru sat in contemplation of the tip of his nose, legs crossed, soles of feet up, eyes half-closed. The guru remained that way, without moving, until Mayhem was out of sight. The guru behaved in a very un-guru-like manner.

The guru got up quite nimbly, joints creaking, skin dry and cracked. Three strides brought him to a tree with a partly hollow trunk. He lifted a radio transmitter and began to talk.

In twenty generations, the initially small population of Ophiuchus IX, all colonists from India on Earth, had increased geometrically. The colonized planet, now, was as over-populated as the teeming sub-continent which long ago had sent the colonists seeking a new home. As a result, unemployment was chronic, discontent widespread, and whatever inner serenity mysticism might bring was widely sought after. This did not stop the non-mystics, however, of whom there were many, from seeking jobs that could pay

money that could fill empty bellies. . . .

A long line gathered outside the employment office of Denebian Exports the morning after Mayhem had left the League building in his new body. Denebian Exports was the largest outworld company currently on Ophiuchus, a company which had solved the outworlder-suicide problem quite simply by hiring no one but natives. Still, hoots and catcalls surrounded those on the employment line. Other jobless Ophiuchans, apparently preferring near-starvation to working for the outworlders, threatened to make the situation dangerous.

Pandit Gandhi Menon, a lean, handsome Ophiuchan of perhaps thirty years, wished there was some way he could shut his ears to the abuse. He needed work. His father and mother were ill, his child was starving, his wife already dead. The gurus offered their own unique solution, of course. The body is nothing, they said. The mind is everything. But thus had the gurus spoken for four thousand years, on Earth and on Ophiuchus. The great majority of Ophiuchans, Pandit Gandhi Menon included, preferred food for the body to

food for mystic thought. Still, the crowds were ugly, threatening to break up the line of job-seekers if Denebian Exports didn't open its doors soon . . .

An unkempt little man, not old but with a matted growth of beard, an unwashed body which gave the impression of wiry strength, and wild eyes, abruptly flung himself at the young woman in line in front of Pandit.

Shouting, "Not our women, too!" the little man attacked the girl, trying to drag her from the line. "It is bad enough our men, but not our women!"

Pandit caught the fanatic's wiry arm and brought it behind his scrawny back in a hammerlock. "Leave her alone," he said. "If you try that again, I'll break your arm."

The fanatic looked at Pandit with hate in his eyes, but stepped back and stood to one side mouthing invective.

The girl, who was about twenty-five years old, had a livid mark on her arm. She wore loin cloth and shawl, the usual garb. She was, Pandit observed for the first time, quite pretty.

"Thank you," she said. "I—I'm not sure I like work-

ing for the outworlders. But I need the money."

"Don't we all," Pandit told her. "But we're not hired yet. I am Pandit Gandhi Menon."

"Sria Krishna," the girl said, smiling at him. "What sort of work is it?"

"Don't you know, Sria Krishna?"

The girl shook her head and Pandit said: "Actually, I guess I don't know, either. But there are rumors the outworlders want jet-pilots. Not for rocketry. For jets. To fly to the Empty Places."

"The Empty Places? Why?"

Pandit shrugged. "Because they are empty, perhaps. Because they are too dry and too arid to support life. Because Denebian Export can claim whatever it found there, for free export. So go the rumors. But surely you can't pilot a jet."

"Can you?"

"Yes," Pandit said promptly with a faint show of pride.

"My father taught me. I want to thank you for what—"

"Nothing. Anyone in my position would have done it. This rabble—"

The rabble was still noisy. Occasionally they hurled

offal at the stragglers joining the rear of the long line. But Pandit and Sria Krishna stood in the forefront, and presently the door opened. In a few minutes Pandit watched the girl disappear inside. He waited nervously, licking dry lips with a parched tongue. It was early morning, but already very hot. He needed the work. Any work. He needed the money which outworlders could pay so abundantly for honest work. He wondered if the fanatic gurus ever thought of that. Then the door in front of him opened again and a fat, unctuous-looking Ophiuchan came out. He seemed to be an official of sorts.

"One more!" he said. "Only one! The rest of you begone."

Behind Pandit there was a general press of bodies, but he was first in line and did not surrender his position. The unctuous-looking man admitted him, half-expecting a bribe. Pandit passed him by; he didn't have a single copper.

He approached a desk. The crowd noise outside was loud, those who had not joined the line crowing because most of those on it had been turned away. Behind the desk sat a small Dene-

bian man of middle years. He looked nervous.

"Can you fly?" he asked in a voice almost desperately thin.

"Yes," Pandit said. Then the rumors were right.

"How much experience?"

"Five years on and off."

"You have a license?"

"There are no licenses on Ophiuchus IX," Pandit pointed out.

"Yes, of course. I'm sorry. Habit. You people don't lie."

"We try not to."

"Your name?"

Pandit told him. The Denebian wrote it down on a form and said: "You'll do. Pay is twenty credits a mission." It wasn't much, but it was more than Pandit had expected.

"What do we fly?" he asked. Questions didn't seem welcome, but no harm trying.

The Denebian looked at him and laughed. "You want the job?"

"Yes, I want the job."

"Then don't ask questions."

Pandit nodded.

"Out through that door, then. The other new pilots are assembling."

And Pandit left the small office.

A moment later a buzzer sounded on the Denebian's

desk. He spoke into a grid: "Orkap here. Go ahead."

"The guru near the League building reports that a native Ophiuchan left the building heading for the city."

"When was this?"

"Yesterday morning."

"And?"

"Draw your own conclusions. Natives don't go near the League headquarters as a rule, do they?"

"No."

"And the League, of course, will want to know about the suicides?"

"Yes, but—"

"But nothing," said the radio voice, which belonged to the only other Denebian currently on Ophiuchus IX. "We can assume this native is a spy. For the League, Orkap."

"All right. I don't see any need to worry, though."

"Don't you? The gurus, like the other natives, can sham, but they can't lie. Sooner or later a guru will be brought out of trance by the League, questioned, and—"

"Tell them about us?" Orkap asked in a shocked voice.

"It could happen. Maybe it's happened already. There won't be any proof, of course, but the League would

send a spy. Suppose I describe this native to you."

Orkap said, "Go ahead," and the radio voice did so.

In a shocked voice Orkap admitted: "I've given that Ophiuchan a pilot's job this morning. There can't be any doubt about it."

"Ah, then you see? You see?"

"I can fix that. I can—"

"Orkap, Orkap. You'll do nothing now. Let the spy alone for now. Then, in the Empty Places, you will merely announce to the pilots that there is a spy among them. Don't reveal who it is." He could not believe his ears.

"But—"

"They want work. They need work. They'll all be afraid the finger of guilt may point at them. They'll work like dogs for you, and I wouldn't be surprised if they uncovered the spy themselves."

"Yes," Orkap said. "Yes, I understand."

"All but one thing, Orkap. There is one thing you don't understand. The spy's identity—"

"You already told me who the spy was."

"Yes. But there is another spy. Working for us, in the League building."

"I never knew," said Orkap.

"The spy among your pilots is more than appearance indicates. Did you ever hear of Johnny Mayhem?"

Orkap's heart jumped into his throat. Who in the galaxy hadn't heard of Mayhem? "But," he gasped, "a—"

"Nevertheless. It is Mayhem."

Orkap was suddenly afraid, more afraid than he had ever been in his life. The ubiquitous Mayhem.

The fierce white sun of Ophiuchus IX broiled down on the Empty Places, a featureless desert two-thousand miles across and as lividly white as bleached bone. In all that burning emptiness, the jet cargo craft looked very small and very insignificant, like black midges on the dead white sand.

Midges among midges, the new pilots walked.

One said: "But I see no cargo."

Another: "These outworlders and their mystery. . . ."

All were sweating, all uncomfortable, but all grateful for the twenty credits a flight they would earn, whatever the cargo turned out to be.

"What do you think?"
Pandit asked Sria.

"I think I've never been so hot in my life. I feel like I'm being broiled alive."

"Here comes the Denebian now."

They had been driven into the Empty Places in a sand sled. The trip had taken two days but because the sled was air-conditioned no one had objected. When they saw the half dozen jets they knew why a sled had taken them into the wilderness. The jets were small cargo-carriers with room for pilot, co-pilot and perhaps a ton of cargo in each. Whatever it was the Denebians wanted exported, it didn't take up much room.

Orkap of Deneb walked toward them past the first of the jets. He began without preamble: "Your cargo is packed and ready to be moved in an underground vault five hundred yards from here. You will break up into pairs, a pilot and co-pilot for each jet." Sria Krishna and Pandit had already paired themselves together. "You work on your own time, getting the cargo with trundle-sleds, loading it, taking off, delivering it to the Denebian freighter at the spaceport. When you are finished, you collect your pay."

"Where do we sleep?"
someone asked.

Orkap smiled. "You didn't come out here to sleep. There is only a limited amount of cargo. The jets are swift. You will be paid according to the amount of work you do. Any other questions?"

"What about food?" a plump young Ophiuchan asked.

"You will be given energy tablets, as many as you wish. Any other questions? No? Good. I have two additional things to say. First, you are not to examine your cargo under any circumstances, either here, or in transit, or on the spacefield. There are televid pick-up units in each jet, so you will be watched at all times. Second—" Orkap paused and let the silence grow and spread across the dazzling white expanse—"there is a spy among you, wearing the body of an Ophiuchan but in reality—well, I don't have to tell you who he is in reality." Orkap smiled grimly. "There is only one body-changer in the galaxy, but one is quite enough."

One of the pilots said, a little breathlessly: "Johnny Mayhem!"

Orkap smiled again. "I am aware of Mayhem's identity,"

he said, "but I'm not going to do anything about it."

The pilots waited. The sun glared down balefully. "You see," Orkap told them, "we cannot be altogether sure that the rest of you are here simply to earn your twenty credits a flight. Mayhem has unwittingly become our insurance. Find Mayhem! Find the spy among you! A hundred credits bonus to the man who does!"

Pandit looked at Sria, who whistled. The girl said: "If they think we can finish the job without sleep, picking up cargo and flying it to the spaceport and returning for more, then a hundred credits is probably more than any of us will earn. They'll all be looking like hawks for this Mayhem."

"And," Pandit agreed, "if there's a native spy among them, he'd be afraid to show himself for fear they'll think he's Mayhem. Very clever of the Denebians."

"... to work at once," Orkap was saying. He wore a blaster on his hip, the only weapon among them. They all trudged behind him through the burning, faceless sands. Soon they reached a depression from which the sand had been cleared, bar-

ing the white bedrock of the Empty Places. In the rock a square opening had been cut, shielded on each side from the shifting sands by an up-curving lip. A ramp led down into darkness.

"You will find your cargo down there. Also enough trundle-sleds to go around," Orkap explained. "The cargo is crated. The crates must remain intact. Is that understood?"

It was understood.

Their sudden mutual suspicion a pall worse than the heat, the Ophiuchans descended the ramp. They needed the money or they wouldn't be here. The money meant more to them than anything: this was no time to be far-sighted. Yet one of them was a spy for the Galactic League—Johnny Mayhem.

One of them, but which?

Pandit made a quick estimate of the number of crates. They were stacked neatly against one wall, each about four feet by four by four. And from the size of them, a single crate would fill the cargo bay of each of the jets. Pandit made a rough estimate. Two dozen crates, perhaps. In the dim light it was hard to tell. Two dozen crates, six jets, twelve Ophiu-

chans. Four trips for each jet. A half hour to load, ten minutes to unload, an hour and a half by jet to the spacefield. Three hours and forty minutes, round trip. Say, four hours. Four times four, sixteen. Sixteen hours of steady work for eighty credits. No time for mystery or suspicion. Barely time for mistrust . . .

"You, there!" a voice called. "What are you doing?"

It was one of the other Ophiuchans, quite the biggest of the lot. Pandit had seen him outside and remembered his name. He was Raj Shiva, a tall, muscular, swarthy Ophiuchan, with small, alert, suspicious eyes and a livid scar alongside his jaw.

"Nothing," Pandit said. "Nothing."

"No? The others are loading already. I'll be watching you."

For a hundred credits, Pandit thought furiously, but said nothing. Sria touched his shoulder. "I have one of the trundle-sleds," she said. "Let's get about it."

"Right," said Pandit.

Raj Shiva watched them a few moments longer, then drifted away with his own partner. It took Pandit and Sria, sweating copiously in the tremendous heat, a few

minutes less than half an hour to load one of the crates aboard their jet. Three of the other ships were already airborne, whining away toward the spacefield.

Pandit looked at the crate. There were no markings on it anywhere. The wood looked new, but that meant absolutely nothing. In the dry heat of the Empty Places, wood would last a century, a millennium. They could not tell how old it was.

"Ready?" Sria Krishna called from the controls.

Pandit had secured the crate in the cargo bay. "Ready," he responded.

Moments later acceleration thrust them back in the twin pilot seats.

Sria leveled the jet at twenty thousand and they sped at eight hundred miles an hour toward the city and the spacefield just beyond it.

"Do you wonder about it?" Sria asked after a while.

"About what?"

"The cargo."

"We aren't supposed to."

"I know." Sria laughed. "I'm a woman, you see."

Pandit grinned at her. "Curiosity," he said. "A woman's trait on any world."

Sria got up from the pilot chair but Pandit placed his

hand on her shoulder and gently shoved her down again. "They have a televid unit aboard," he said, "remember?"

Sria nodded. The jet sped on.

They landed at the spacefield. They were the fourth jet down and one of the other three had taken off on the return leg of the flight. A Denebian Pandit had never seen before was supervising the loin-cloth garbed laborers loading the crates aboard a Denebian spaceship. With Sria he delivered their crate on the trundle-sled, returned with the sled to their jet, and took off.

Just short of four hours from the time they started they returned to the Empty Places. They had gained a little time and were the second team down. From the jet ahead of them, Raj Shiva led a puny, middle-aged copilot.

Orkap stood in the underground storage room. Looking at his wrist chrono he said to the four Ophiuchans who came down the ramp: "You made fine time." Raj Shiva's puny companion said something, but Raj Shiva grabbed his arm and they began to load a second crate.

Pandit and Sria loaded theirs in silence.

They made their second round trip in four hours exactly. It was completely dark when they returned to the Empty Places. Sria was worried they would overshoot the cargo point, but Pandit brought the little jet down within a few hundred yards of its takeoff point.

They could see nothing when they shut off the jet's running lights, except for the glow which came from the underground room. They reached it and went down the ramp. Pandit judged that half the crates were gone now. He took a quick tour of the dimly-lit room while Sria got the trundle-sled into position against one of the crates.

"Nobody here," Pandit said in a whisper. "The Denebian must be sleeping in the sand-sled."

"Yes," Sria said a little breathlessly.

"I was thinking—"

"What?" Sria said. "Don't stop."

"If we wanted to examine one of the boxes, it would be suicide to open the one we take. But we could open one of them down here, see what it is, take another for ourselves—"

"You would do this?" Sria asked him. "Why?"

Pandit shrugged. "I have eyes," he said. "Our gurus did not broadcast the death-wish to outworlders until the Denebians came. Then they started. Have the Denebians sold them on the idea?"

"I don't know," Sria said.

"Well, let's assume they have. Why? Why would they do such a thing, Sria?"

"Let me get this straight, Pandit. First, you think the gurus actually are making the outworlders kill themselves?"

"Of course," Pandit said. "It's mental suggestion, on a scale only our gurus are capable of. But don't you see, Sria, they wouldn't do it on their own. The gurus are dirty, careless about their bodies—but terribly arrogant. Left alone, they wouldn't think the outworlders important enough to be concerned over one way or another. They certainly wouldn't kill them."

"Go on," Sria urged.

"All right. The gurus have great knowledge of the mystical, but externally they're naive. Let's suppose someone came along—the Denebians in this case—and found something they wanted very

badly on Ophiuchus. These crates here, Sria. What would they do? They'd go to the gurus and convince them—it wouldn't be difficult—that any intercourse with outworlders would be harmful to Ophiuchus, that the outworlders want to colonize and exploit our world, that sort of thing. While the gurus are stewing it over, the Denebians could have prepared this shipment here—whatever it is—for departure. But the gurus, too well convinced by them, could have acted sooner than they expected, making it all but impossible for the small handful of outworlders, the Denebians among them, to go abroad without fear of taking their own lives. Perhaps a few, like Orkap and that other Denebian, are not at all suicide-prone. Perhaps a few can withstand it. As for the rest, it's indoors and away from the mental influence of the gurus, or off Ophiuchus entirely. Which would leave the Denebians with a problem they hadn't thought of." His words made sense.

"Yes!" cried Sria excitedly. "Now that they have their valuable cargo ready to go, how can they get it off Ophiuchus without help?"

"We," said Pandit softly, "are that help."

Sria asked: "What are you going to do about it?"

"I don't know. I honestly don't. I never had anything against the outworlders. How could I? We're all progeny of outworlders who came here almost five hundred years ago from a place called India on Earth. But the gurus—"

"—have been deceived. You said so yourself."

Pandit was sweating, and it was more than the heat which made him sweat. He paced up to the crates, then back again, then to the crates. Suddenly he said, "All right. All right, I'll do it. Someone's got to find out what the Denebians want here."

And Pandit began to pry at one of the boxes with a knife he carried in his loin cloth. Sria said, "I'll keep watch. You call me when it's opened."

"Maybe you ought to get out of here. In case anything happens, I don't want to get you involved."

But Sria went up the ramp and crouched there, waiting, watching. The desert was very quiet, entirely windless, and hot even at night. Stars sprinkled the sky overhead

and far off she thought she heard the distant whine of a jet. "Hurry," she called. From below she heard the sound of wood being pried away from wood. She heard, or imagined she heard, the jet coming closer. "Hurry!" she called softly.

Finally three words drifted up to her. "Come here, Sria." She felt a little relieved. Now that he'd finished.

She listened for the jet. Now she heard nothing. She went swiftly down the ramp.

Pandit stood before one of the crates, perspiring freely. He had pried loose one of the side walls and a smooth metal surface with stenciled lettering on it was exposed.

He said: "I can't read that. It's a language I never saw before."

Sria bent closer and looked at the stenciled lettering. A voice, not Pandit's, said:

"I thought it would be you two . . . No, don't move!"

A big muscular figure silhouetted against the starlight, and a smaller, puny, thin-legged figure. Raj Shiva and his co-pilot.

"A hundred credits each, Handus," Raj Shiva said as he ran down the ramp. "Can you keep the girl from getting away?"

Handus rushed down at his heels.

Pandit met Raj Shiva at the foot of the ramp. Pandit was a big man by Ophiuchan standards, but Raj Shiva was bigger. "Run, Sria!" Pandit cried, and met the giant with his knife.

Raj Shiva parried the blow with his forearm, then his big hands moved swiftly and the knife clattered to the floor. Sria ran for the ramp, her bare feet padding swiftly against the stone floor. Handus was waiting for her at the foot of the ramp in an awkward crouch. She had a glimpse of Raj Shiva and Pandit straining together, then Handus struck her with his balled fist. It was a puny blow, but Sria staggered back, her jaw numb. Laughing shrilly, Handus leaped at her. She was shoved back, tripped over something, and fell. For a moment all the lights blinked out inside her head.

Inside—no! Raj Shiva and Pandit stumbled about the room, struck something, there was a loud popping sound, a tinkling, and the lights in the storage room went out.

"Where is she?" Handus called. "I can't find her!"

She heard him groping

about, heard the other struggling together. She got to her feet and stood perfectly still, waiting for anything. She wished she had a weapon—something—she was only a woman—

Then a voice whispered: "Hurry, Sria! Hurry!"

"Pandit?"

He took her arm in the darkness. She couldn't see him. They went to the crates and wrestled one on their trundle-sled.

"Not the open one?" Sria gasped.

"No. No."

They heard footsteps . . . Saw a figure for a moment silhouetted against starlight. Handus was fleeing, probably for help.

They took their sled out into the night and dragged it across the sand toward their waiting jet. They loaded the crate in the cargo bay. While Pandit was finishing the job in the darkness, Sria sat down at the controls.

"Ready?" she shouted above the whine of the jets.

Pandit said that he was. She hardly heard his voice.

A moment later, she took the small cargo jet up.

She heard Pandit moving in the small cabin behind her. She said: "We ought to

take it to the League authorities, don't you think?" She had to shout to be heard above the whining roar of the jets.

"Why?"

"I was able to read the writing. It's Procyonian, Pandit. Do you know anything about the Procyonians?"

"Well, a few centuries ago, they were the most warlike people in the galaxy. It was rumored they had a cache of thermonuclear bombs hidden somewhere, after such weapons were outlawed in the twenty-fifth century. The cache was never found, until tonight. We found it, Pandit."

"But Orkap and—"

"That's true. It was found by the Denebians first. Don't you see, Pandit? Orkap and the others, private Denebian traders. It wasn't the government. It never is the government these days. But unscrupulous individuals, Pandit, armed with two dozen hydrogen bombs—why, they could take over their own world on threat of imminent destruction, or some outworld plum they had their eye on, or—"

"I see." Pandit's voice was barely audible above the whine of the jets.

"It's a job the Galactic League can handle," Sria went on. "Now that it's out in the open—or will be as soon as we get to the space-field. You've done your work, Pandit, and your people won't forget you for it. As for me, my work here is finished too."

"Your work?"

Above the roar of the jet, Sria shouted: "Yes. I am Johnny Mayhem." She smiled in the darkness. Johnny Mayhem, she thought, in a girl's body. Well, he'd been young men and old, weak and strong, sick and healthy, human and alien outworlder—so why not a girl too?

All at once Pandit's hand lay heavily on her shoulder. She turned around and in the darkness but with the lights of the instrument board on it saw the gleam of a knife blade. The face beyond the blade, leering from darkness, was not Pandit's. She hadn't actually known it was Pandit. She hadn't seen him. She'd hardly been able to hear his voice.

It was Raj Shiva.

"Fly us to Denebian Exports," he said, "or I'll kill you and do it myself."

"You're making a mistake. Your people belong with the

Galactic League, not with a handful of adventurers who—"

"The Denebians are right," Raj Shiva said fanatically. "My people would be better off left alone."

"I'm flying this jet to the spaceport—and the League."

"I'll kill you. I know all about you, Mayhem. You're not a woman, really. You're not even a native. That's a dead body, isn't it? But if I kill it—again—while you're in it, you die to. You'll do what I say!"

This very night, unless something was done about it, the cache of thermonuclear weapons would be space-bound, the first hydrogen bombs loose in the galaxy for almost five hundred years. Wouldn't mankind ever begin to learn? Mayhem-Sria thought wearily. He knew the answer, of course: most men would, but the few who refused could bring destruction to an entire galaxy. . . .

Moments before, apparent success of a mission. Now, failure. Or death. Or both.

Sria's hand flashed out suddenly and struck the instrument board. The jet plummeted earthward with a loud whining sound. Sria felt herself shoved back by

the tremendous acceleration into the cushions of the pilot chair. She heard a wild exclamation from Raj Shiva, but couldn't turn around to see what had happened. Grim-lipped, she kept the ship hurtling Earthward. She knew it was dangerous and might even prove disastrous. Her body could take so much, then she would black out. But if she didn't maintain the dive until the last possible instant, Raj Shiva would get control of the ship and its vital cargo. She was only a girl, but she was protected by the crash-padding of the pilot chair. Raj Shiva, unprotected, was behind her somewhere. . . .

Down through the thin upper atmosphere of Ophiuchus IX screamed the small ship, its heat-dial blinking on and off in warning as friction scorched its thin shell. The scream of air became more deep-throated as the atmosphere became thicker. . . .

Ten thousand feet.

Eight thousand.

Six.

Sria's eyes saw black. Her breath was labored. Needles of pain darted in her skull, plucked at her eyes. She opened her mouth to scream but heard nothing. She felt as if she must be forced clear

through the protective cushions of the pilot chair.

Five thousand feet.

Four thousand.

Blackness and peace and a settling lassitude. . . .

Three thousand feet.

With hands that would barely function, Sria with supreme effort brought the jet out of its death-dive. She slumped in the pilot chair for a long time, too weak to do anything else.

Then she looked back at Raj Shiva.

Who lay slack and unconscious against the rear bulkhead of the cargo ship.

Mayhem-Sria brought the jet down and, middle of the night or no, saw Kovandawamy. Raj Shiva was taken into custody. A jet was sent out, loaded with Leaguemen who had proved immune to the guru death-wish and all armed to the teeth. It landed at the cache and stood guard over it. Pandit was found, unconscious, one of his arms broken, but otherwise all right. A second jet prevented the Denebian Export ship from blasting off with the

hydrogen bombs already loaded. Orkap and his companion were taken into custody.

The rest, of course, is history. The gurus of Ophiuchus IX were shown what had been taking place in the name of friendship between themselves and Deneb and in the name of isolation. Most of the gurus retired entirely from active life. The few who did not spent the rest of their days working for cooperation between Ophiuchus and the rest of the Galactic League. Orkap and his companion were sent back to Deneb for punishment.

Two weeks later, Kovandawamy shook Sria's hand.

"A girl," he said. "You did it as a girl. I still can't believe it. But then, of such stuff is the Mayhem legend made."

Mayhem smiled. Already the Hub had a new assignment for him. He could feel the old excitement, the wonder, stirring him. He smiled again and told Kovandawamy: "Better not tell that fellow Pandit. I think he had a crush on Sria."

THE END

Graves said jerkily:

"The other machines that received these broadcasts did break down, Sergeant. All of them."

"Sure!" said the sergeant with dignity. "O' course, who's broadcastin' may have been tinkerin' with their signal since they seen it wasn't gettin' through. Betsy can take it now, when younger machines with less experience can't. Maybe a micro-micro-watt of signal. Then it makes her sweat. If she was broadcastin', with a hell of a lot more'n a micro-microwatt—it'd be bad! I bet you that every machine we make to broadcast breaks down! I bet—"

Howell said curtly:

"Reasonable enough! A signal to pass through time as well as space would be different from a standard wave-type! Of course that must be the answer."

Sergeant Bellews said truculently:

"I got a hunch that whoever's broadcastin' is busting transmitters right an' left. I never knew anything about this before, except that Betsy was pickin' up stuff that came from nowhere. But I bet if you look over the record-tapes you will find they got breaks where one transmitter switch-

ed off or broke down and another took over!"

Lecky's eyes were shining. He regarded Sergeant Bellews with a sort of tender respect.

"Sergeant Bellews," he said softly, "I like you very much. You have told us undoubtedly true things."

"Think nothin' of it," said the sergeant, gratified. "I run the Rehab Shop here, and I could show you things—"

"We wish you to," said Lecky. "The reaction of machines to these broadcasts is the one viewpoint we would never have imagined. But it is plainly important. Will you help us, Sergeant? I do not like to be frightened—and I am!"

"Sure, I'll help," said Sergeant Bellews largely. "First thing is to whip some stuff together so we can find out what's what. You take a few Mahon units, and install 'em and train 'em right, and they will do almost anything you've a mind for. But you got to treat 'em right. Machines work by the golden rule. Always! Come along!"

Sergeant Bellews went to the Rehab Shop, followed only by Lecky. All about, the sun shone down upon buildings with a remarkably temporary look about them, and on lawns

with a remarkably lush look about them, and signboards with very black lettering on gray paint backgrounds. There was a very small airfield inside the barbed-wire fence about the post, and elaborate machine-shops, and rows and rows of barracks and a canteen and a USO theatre, and a post post-office. Everything seemed quite matter-of-fact.

Except for the machines.

They were the real reason for the existence of the post. The barracks and married-row dwellings had washing-machines which looked very much like other washing-machines, except that they had standby lights which flickered meditatively when they weren't being used.

The television receivers looked like other TV sets, except for minute and wavering standby lights which were never quite as bright or dim one moment as the next. The jeeps—used strictly within the barbed-wire fence around the post—had similar yellow glowings on their instrument-boards, and they were very remarkable jeeps. They never ran off the graveled roads onto the grass, and they never collided with each other, and it was said that the nine-year-

old son of a lieutenant-colonel had tried to drive one and it would not stir. Its motor cut off when he forced it into gear. When he tried to re-start it, the starter did not turn. But when an adult stepped into it, it operated perfectly—only it braked and stopped itself when a small child toddled into its path.

There were some people who said that this story was not true, but other people insisted that it was. Anyhow the washing-machines were perfect. They never tangled clothes put into them. It was reported that Mrs. So-and-so's washing-machine had found a load of clothes tangled, and reversed itself and worked backward until they were straightened out.

Television sets turned to the proper channels—different ones at different times of day—with incredible facility. The smallest child could wrench at a tuning-knob and the desired station came on. All the operating devices of Research Installation 83 worked as if they liked to—which might have been alarming except that they never did anything of themselves. They initiated nothing. But each one acted like an old, favorite possession. They fitted their masters. They seemed to tune

themselves to the habits of their owners. They were infinitely easy to work right, and practically impossible to work wrong.

Such machines, of course, had not been designed to cope with enigmatic broadcasts or for military purposes. But the jet-planes on the small airfield were very remarkable indeed, and the other and lesser devices had been made for better understanding of the Mahon units which made machines into practically a new order of creation.

Sergeant Bellews ushered Lecky into the Rehab Ship. There was the pleasant, disorderly array of devices with their wavering standby lights. They gave an effect of being alive, but somehow it was not disturbing. They seemed not so much intent as meditative, and not so much watchful as interested. When the sergeant and his guest moved past them, the unrhythmic waverings of the small yellow lights seemed to change hopefully, as if the machines anticipated being put to use. Which, of course, was absurd. Mahon machines do not anticipate anything. They probably do not remember anything, though patterns of operation are certainly retained in very

great variety. The fact is that a Mahon unit is simply a device to let a machine stand idle without losing the nature of an operating machine.

The basic principle goes back to antiquity. Ships, in ancient days, had manners and customs individual to each vessel. Some were sweet craft, easily handled and staunch and responsive. Others were stubborn and begrudging of all helpfulness. Sometimes they were even man-killers. These facts had no rational explanation, but they were facts. In similarly olden times, particular weapons acquired personalities to the point of having personal names—Excalibur, for example.

Every fighting man knew of weapons which seemed to possess personal skill and ferocity. Later, workmen found that certain tools had a knack of fitting smoothly in the hand—seeming even to divine the grain of the wood they worked on. The individual characteristics of violins were notorious, so that a violin which sang joyously under the bow was literally priceless.

And all these things, as a matter of observation and not of superstition, kept their qualities only when in constant use. Let a ship be hauled out of water and remain there

for a time, and she would be clumsy on return to her native element. Let a sword or tool stay unused, and it seemed to dull. In particular, the finest of violins lost its splendor of tone if left unplayed, and any violin left in a repair-shop for a month had to be played upon constantly for many days before its living tone came back.

The sword and the tool perhaps, but the ship and the violin certainly, acted as if they acquired habits of operation by being used, and lost them by disuse. When more complex machines were invented, such facts were less noticeable. True, no two automobiles ever handled exactly the same, and that was recognized. But the fact that no complex machine worked well until it had run for a time was never commented on, except in the observation that it needed to be warmed up. Anybody would have admitted that a machine in the act of operating was a dynamic system in a solid group of objects, but nobody reflected that a stopped machine was a dead thing. Nobody thought to liken the warming-up period for an aeroplane engine to the days of playing before a disused violin regained its tone.

Yet it was obvious enough.

A ship and a sword and a tool and a violin were objects in which dynamic systems existed when they were used, and in which they ceased to exist when use stopped. And nobody noticed that a living creature is an object which contains a dynamic system when it is living, and loses it by death.

For nearly two centuries quite complex machines were started, and warmed up, and used, and then allowed to grow cold again. In time the more complex machines were stopped only reluctantly. Computers, for example, came to be merely turned down below operating voltage when not in use, because warming them up was so difficult and exacting a task. Which was an unrecognized use of the Mahon principle. It was a way to keep a machine activated while not actually operating. It was a state of rest, of loafing, of idleness, which was not the death of a running mechanism.

The Mahon unit was a logical development. It was an absurdly simple device, and not in the least like a brain. But to the surprise of everybody, including its inventor, a Mahon-modified machine did more than stay warmed up. It retained operative habits as no complex device had ever

done before. In time it was recognized that Mahon-modified machines acquired experience and kept it so long as the standby light glowed and flickered in its socket. If the lamp went out the machine died, and when reenergized was a different individual entirely, without experience.

Sergeant Bellews made such large-minded statements as were needed to brief Lecky on the work done in this installation with Mahon-controlled machines.

"They don't think," he explained negligently, "any more than dogs think. They just react—like dogs do. They get patterns of reaction. They get trained. Experienced. They get good! Over at the airfield they're walking around beaming happy over the way the jets are flyin' themselves."

Lecky gazed around the Rehab Shop. There were shelves of machines, duly boxed and equipped with Mahon units, but not yet activated. Activation meant turning them on and giving them a sort of basic training in the tasks they were designed to do. But also there were machines which had broken down—invariably through misuse, said Sergeant Bellews acidly—and had been sent to the Re-

hab Shop to be re-trained in their proper duties.

"Guys see 'em acting sensible and obediently," said Bellews with bitterness, "and expect 'em to think. Over at the jet-field they finally come to understand." His tone moderated. "Now they got jets that put down their own landing-gear, and holler when fuel's running low, and do acrobatics happy if you only jiggle the stick. They mighty near fly themselves! I tell you, if well-trained Mahon jets ever do tangle with old-style machines, it's goin' to be a caution to cats! It'll be like a pack of happy terriers pilin' into hamsters. It'll be murder!"

He surveyed his stock. From a back corner he brought out a small machine with an especially meditative tempo in its standby-lamp flicker. The tempo accelerated a little when he put it on a workbench.

"They got batteries to stay activated with," he observed, "and only need real juice when they're workin'. This here's a play-back recorder they had over in Recreation. Some guys trained it to switch frequencies—speed-up and slow-down stuff. They laughed themselves sick! There used to

be a tough guy over there,—a staff sergeant, he was—that gave lectures on military morals in a deep bass voice. He was proud of that bull voice of his. He used it frequently. So they taped him, and Al here—" the name plainly referred to the machine—"used to play it back switched up so he sounded like a squeaky girl. That poor guy, he liked to busted a blood-vessel when he heard himself speakin' soprano. He raised hell and they sent Al here to be rehabilitated. But I switched another machine for him and sent it back, instead. Of course, Al don't know what he's doing, but—"

He brought over another device, slightly larger and with a screen.

"Somebody had a bright notion with this one, too," he said. "They figured they'd scramble pictures for secret transmission, like they scramble voice. But they found they hadda have team-trained sets to work, an' they weren't interchangeable. They sent Gus here to be deactivated an' trained again. I kinda hate to do that. Sometimes you got to deactivate a machine, but it's like shooting a dog somebody's taught to steal eggs, who don't know it's wrong."

He bolted the two instruments together. He made connections with flexible cables and tucked the cable out of sight. He plugged in for power and began to make adjustments.

The small scientist asked curiously:

"What are you preparing, Sergeant?"

"These two'll unscramble that broadcast," said Sergeant Bellevs, with tranquil confidence. "Al's learned how to make a tape and switch frequencies expert. Gus, here, he's a unscrambler that can make any kinda scanning pattern. Together they'll have a party doing what they're special trained for. We'll hook 'em to Betsy's training-terminals."

He regarded the two machines warmly. Connected, now, their standby lights flickered at a new tempo. They synchronized, and broke synchrony, and went back into elaborate, not-quite-resolvable patterns which were somehow increasingly integrated as seconds went by.

"Those lights look kinda nice, don't they?" asked the sergeant admiringly. "Makes you think of a coupla dogs gettin' acquainted when they're goin' out on a job of hunting or something."

But Lecky said abruptly, in amazement:

"But, Sergeant! In the Pentagon it takes days to unscramble a received broadcast such as Betsy receives! It requires experts—"

"Huh!" said Sergeant Bellews. He picked up the two machines. "Don't get me started about the kinda guys that wangle headquarters-company jobs! They got a special talent for fallin' soft. But they haven't necessarily got anything else!"

Lecky followed Sergeant Bellews as the sergeant picked up his new combination of devices and headed out of the Rehab Shop. Outside, in the sunshine, there were roarings to be heard. Lecky looked up. A formation of jets swam into view against the sky. A tiny speck, trailing a monstrous plume of smoke, shot upward from the jet-field. The formation tightened.

The ascending jet jiggled as if in pure exuberance as it swooped upward—but the jiggle was beautifully designed to throw standard automatic gunights off.

A plane peeled off from the formation and dived at the ascending ship. There was a curious alteration in the thunder of motors. The rate-of-

rise of the climbing jet dwindled almost to zero. Sparks shot out before it. They made a cone the diving ship could not avoid. It sped through them and then went as if disappointedly to a lower level. It stood by to watch the rest of the dog-fight.

"Nice!" said Sergeant Bellews appreciatively. "That's a Mahon jet all by itself, training against regular ships. They have to let it shoot star-bullets in training, or it'd get hot and bothered in a real fight when its guns went off."

The lower jet streaked skyward once more. Sparks sped from the formation. They flared through emptiness where the Mahon jet had been but now was not. It scuttled abruptly to one side as concerted streams of sparks converged. They missed. It darted into zestful, exuberant maneuverings, remarkably like a dog dashing madly here and there in pure high spirits. The formation of planes attacked it resolutely.

Suddenly the lone jet plunged into the midst of the formation, there were coruscations of little shooting stars, and one—two—three planes disgustedly descended to lower levels as out of action. Then the single ship shot upward, seemed eagerly to shake it-

self, plunged back—and the last ships tried wildly to escape, but each in turn was technically shot down.

The Mahon jet headed back for its own tiny airfield. Somehow, it looked as if, had it been a dog, it would be wagging its tail and panting happily.

"That one ship," said Lecky blankly, "it defeated the rest?"

"It's got a lot of experience," said the sergeant. "You can't beat experience."

He led the way into Communications Center. In the room where Betsy stood, Howell and Graves had been drawing diagrams at each other to the point of obstinacy.

"But don't you see?" insisted Howell angrily. "There can be no source other than a future time! You can't send short waves through three-dimensional space to a given spot and not have them interceptible between. Anyhow, the Compubs wouldn't work it this way! They wouldn't put us on guard! And an extra-terrestrial wouldn't pretend to be a human if he honestly wanted to warn us of danger! He'd tell us the truth! Physically and logically it's impossible for it to be anything but what it claims to be!"

Graves said doggedly:

"But a broadcast originating in the future is impossible!"

"Nothing," snapped Howell, "that a man can imagine is impossible!"

"Then imagine for me," said Graves, "that in 2180 they read in the history books about a terrible danger to the human race back in 1972, which was averted by a warning they sent us. Then, from their history-books, which we wrote for them, they learn how to make a transmitter to broadcast back to us. Then they tell us how to make a transmitter to broadcast ahead to them. They don't invent the transmitter. We tell them how to make it—via a history book. We don't invent it. They tell us—from the history book. Now imagine for me how that transmitter got invented!"

"You're quibbling," snapped Howell. "You're refusing to face a fact because you can't explain it. I say face the fact and then ask for an explanation!"

"Why not ask them," said Graves, "how to make a round square or a five-sided triangle?"

Sergeant Bellews pushed to a spot near Betsy. He put down his now-linked Mahon-

modified machines and began to move away some of the recording apparatus focused on Betsy.

"Hold on there!" said Howell in alarm. "Those are recorders!"

"We'll let 'em record direct," said the sergeant.

Lecky spoke feverishly in support of Bellews. But what he said was, in effect, a still-marveling description of the possibilities of Mahon-modified machines. They were, he said with ardent enthusiasm, the next step in the historic process by which successively greater portions of the cosmos enter into a symbiotic relationship with man. Domestic animals entered into such a partnership aeons ago. Certain plants—wheat and the like—even became unable to exist without human attention. And machines were wrought by man and for a long time served him reluctantly. Pre-Mahon machines were tamed, not domestic. They wore themselves out and destroyed themselves by accidents. But now there were machines which could enter into a truly symbiotic relationship with humanity.

"What," demanded Howell, "what in hell are you talking about?"

Lecky checked himself. He smiled abashedly:

"I think," he said humbly, "that I speak of the high destiny of mankind. But the part that applies at the moment is that Sergeant Bellews must not be interfered with."

He turned and ardently assisted Sergeant Bellews in making room for the just-brought devices. Sergeant Bellews led flexible cables from them to Betsy. He inserted their leads in her training-terminals. He made adjustments within.

It became notable that Betsy's standby light took up new tempos in its wavering. There were elaborate interweavings of rate and degree of brightening among the lights of all three instruments. There was no possible way to explain the fact, but a feeling of pleasure, of zestful stirring, was somehow expressed by the three machines which had been linked together into a cooperating group.

Sergeant Bellews eased himself into a chair.

"Now everything's set," he observed contentedly. "Remember, I ain't seen any of these broadcasts unscrambled. I don't know what it's all about. But we got three Mahon machines set up now to work on the next crazy broad-



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cast that comes in. There's Betsy and these two others. And all machines work accordin' to the Golden Rule, but Mahon machines—they are honey-babes! They'll bust themselves tryin' to do what you ask 'em. And I asked these babies for plenty—only not enough to hurt 'em. Let's see what they turn out."

He pulled a pipe and tobacco from his pocket. He filled the pipe. He squeezed the side of the bowl and puffed as the tobacco glowed. He relaxed, underneath the wall-sign which sternly forbade smoking by all military personnel within these premises.

It was nearly three hours—but it could have been hundreds—before Betsy's screen lighted abruptly.

The broadcast came in; a new transmission. The picture-pattern on Betsy's screen was obviously not the same as other broadcasts from nowhere. The chirps and peepings and the rumbling deep sounds were not repetitions of earlier noise-sequences. It should have taken many days of finicky work by technicians at the Pentagon before the originally broadcast picture could be seen and the sound interpreted. But a play-back recorder named Al, and a pic-

ture-unscrambler named Gus were in closed-circuit relationship with Betsy. She received the broadcast and they unscrambled the sound and vision parts of it immediately.

The translated broadcast, as Gus and Al presented it, was calculated to put the high brass of the defense forces into a frenzied tizzy. The anguished consternation of previous occasions would seem like very calm contemplation by comparison. The high brass of the armed forces should grow dizzy. Top-echelon civilian officials should tend to talk incoherently to themselves, and scientific consultants—biologists in particular—ought to feel their heads spinning like tops.

The point was that the broadcast had to be taken seriously because it came from nowhere. There was no faintest indication of any signal outside of Betsy's sedately gray-painted case. But Betsy was not making it up. She couldn't. There was a technology involved which required the most earnest consideration of the message carried by it.

And this broadcast explained the danger from which the alleged future wished to rescue its alleged past. A brisk, completely deracialized broad-

caster appeared on Gus's screen.

In clipped, oddly stressed, but completely intelligible phrases, he explained that he recognized the paradox his communication represented. Even before 1972, he observed, there had been argument about what would happen if a man could travel in time and happened to go back to an earlier age and kill his grandfather. This communication was an inversion of that paradox. The world of 2180 wished to communicate back in time and save the lives of its great-great-great-grandparents so that it—the world of 2180—would be born.

Without this warning and the information to be given, at least half the human race of 1972 was doomed.

In late 1971 there had been a mutation of a minor strain of *staphylococcus* somewhere in the Andes. The new mutation thrived and flourished. With the swift transportation of the period, it had spread practically all over the world unnoticed, because it produced no symptoms of disease.

Half the members of the human race were carriers of the harmless mutated *staphylococcus* now, but it was about to mutate again in accordance with Gordon's Law (the refer-

ence had no meaning in 1972) and the new mutation would be lethal. In effect, one human being in two carried in his body a semi-virus organization which he continually spread, and which very shortly would become deadly. Half the human race was bound to die unless it was instructed as to how to cope with it. Unless—

Unless the world of 2180 told its ancestors what to do about it. That was the proposal. Two-way communication was necessary for the purpose, because there would be questions to be answered, obscure points to be clarified, numerical values to be checked to the highest possible degree of accuracy.

Therefore, here were diagrams of the transmitter needed to communicate with future time. Here were enlarged diagrams of individual parts. The enigmatic parts of the drawing produced a wave-type unknown in 1972. But a special type of wave was needed to travel beyond the three dimensions of ordinary space, into the fourth dimension which was time. This wave-type produced unpredictable surges of power in the transmitter, wherefore at least six transmitters should be built

and linked together so that if one ceased operation another would instantly take up the task.

The broadcast ended abruptly. Betsy's screen went blank. The colonel was notified. A courier took tapes to Washington by high-speed jet. Life in Research Establishment 83 went on sedately. The barracks and the married quarters and the residences of the officers were equipped with Mahon-modified machines which laundered diapers perfectly, and with dial telephones which always rang right numbers, and there were police-up machines which took perfect care of lawns, and television receivers tuned themselves to the customary channels for different hours with astonishing ease. Even jet-planes equipped with Mahon units almost landed themselves, and almost flew themselves about the sky in simulated combat with something very close to zest.

But the atmosphere in the room in Communications was tense.

"I think," said Howell, with his lips compressed, "that this answers all your objections, Graves. Motive—"

"No," said Lecky painfully. "It does not answer mine. My

objection is that I do not believe it."

"Huh!" said Sergeant Bellevs scornfully. "O' course, you don't believe it! It's phoney clear through!"

Lecky looked at him hopefully.

"You noticed something that we missed, Sergeant?"

"Hell, yes!" said Sergeant Bellevs. "That transmitter diagram don't have a Mahon unit in it!"

"Is that remarkable?" demanded Howell.

"Remarkable dumb," said the sergeant. "They'd ought to know—"

The tall young lieutenant who earlier had fetched Sergeant Bellevs to Communications now appeared again. He gracefully entered the room where Betsy waited for more broadcast matter. Her standby light flickered with something close to animation, and the similar yellow bulbs on Al and Gus responded in kind. The tall young lieutenant said politely:

"I am sorry, but pending orders from the Pentagon the colonel has ordered this room vacated. Only automatic recorders will be allowed here, and all records they produce will be sent to Washington without examination. It seems that no one on this post has

the necessary clearance for this type of material."

Lecky blinked, Graves sputtered:

"But — dammit, do you mean we can work out a way to receive a broadcast and not be qualified to see it?"

"There's a common-sense view," said Sergeant Bellews oracularly, "and a crazy view, and there's what the Pentagon says, which ain't either." He stood up. "I see where I go back to my shop and finish rehabilitating the colonel's vacuum cleaner. You gentlemen care to join me?"

Howell said indignantly:

"This is ridiculous! This is absurd!"

"Uh-uh," said Sergeant Bellews benignly. "This is the armed forces. There'll be an order makin' some sort of sense come along later. Meanwhile, I can brief you guys on Mahon machines so you'll be ready to start up again with better information when a clearance order does come through. And I got some beer in my quarters behind the Rehab Shop. Come along with me!"

He led the way out of the room. The young lieutenant paused to close the door firmly behind him and to lock it. A bored private, with side-arms, took post before it. The lieu-

tenant was a very conscientious young man.

But he did not interfere with the parade to Sergeant Bellews' quarters. The young lieutenant was very military, and the ways of civilians were not his concern. If eminent scientists chose to go to Sergeant Bellews' quarters instead of the Officers Club, to which their assimilated rank entitled them, it was strictly their affair.

They reached the Rehab Shop, and Sergeant Bellews went firmly to a standby-light-equipped refrigerator in his quarters. He brought out beer and deftly popped off the tops. The icebox door closed quietly.

"Here's to crime," said Sergeant Bellews amiably.

He drank. Howell sipped gloomily. Graves drank thoughtfully. Lecky looked anticipative.

"Sergeant," he said, "did I see a gleam in your eye just now?"

Sergeant Bellews reflected, gently shaking his opened beer-can with a rotary motion, for no reason whatever.

"Uh-uh," he rumbled. "I wouldn't say a gleam. But you mighta seen a glint. I got some ideas from what I seen during that broadcast. I wanna get to work on 'em. Here's the place

to do the work. We got facilities here."

Howell said with precise hot anger:

"This is the most idiotic situation I have ever seen even in government service!"

"You ain't been around much," the sergeant told him kindly. "It happens everywhere. All the time. It ain't even a exclusive feature of the armed forces." He put down his beer-can and patted his stomach. "There's guys who sit up nights workin' out standard operational procedures just to make things like this happen, everywhere. The colonel hadda do what he did. He's got orders, too. But he felt bad. So he sent the lieutenant to tell us. He does the colonel's dirty jobs—and he loves his work."

He moved grandly toward the Rehab Shop proper, which opened off the quarters he lived in—very much as a doctor's office is apt to open off his living quarters.

"We follow?" asked Lecky zestfully. "You plan something?"

"Natural!" said Sergeant Bellews largely.

He led the way into the Rehab Shop, which was dark and shadowy, and only very dimly lighted by flickering, waver-

ing lights of many machines waiting as if hopefully to be called on for action. There were the shelves of machines not yet activated. Sergeant Bellews led the way toward his desk. There was a vacuum cleaner on it, on standby. He put it down on the floor.

Lecky watched him with some eagerness. The others came in, Howell dourly and Graves wiping his moustache.

The sergeant considered his domain.

"We'll be happy to help you," said Lecky.

"Thanks," said the sergeant. "I'm under orders to help you, too, y'know. Just supposing you asked me to whip up something to analyze what Betsy receives, so it can be checked on that it is a new wave-type."

"Can you do that?" demanded Graves. "We were supposed to work on that—but so far we've absolutely nothing to go on!"

The sergeant waved his hand negligently.

"You got something now. Betsy's a Mahon-modified device. Every receiver that picked up one of those crazy broadcasts broke down before it was through. She takes 'em in her stride—especial with Al and Gus to help her. Wouldn't it be reasonable to guess that

Mahon machines are—uh—especial adapted to handle intertemporal communication?"

"Very reasonable!" said Howell dourly. "Very! The broadcast said that the wave-type produced unpredictable surges of current. Ordinary machines do find it difficult to work with whatever type of radiation that can be."

"Betsy chokes off those surges," observed the sergeant. "With Gus and Al to help, she don't have no trouble. We hadn't ought to need to make any six transmitters if we put Mahon-unit machines together for the job!"

"Quite right," agreed Lecky, mildly. "And it is odd—"

"Yeah," said the sergeant. "It's plenty odd my great-great-great-grandkids haven't got sense enough to do it themselves!"

He went to a shelf and brought down a boxed machine,—straight from the top-secret manufactory of Mahon units. It had never been activated. Its standby light did not glow. Sergeant Bellevs ripped off the carton and said reflectively:

"You hate to turn off a machine that's got its own ways of working. But a machine that ain't been activated has not got any personality. So

you don't mind starting it up to turn it off later."

He opened the adjustment-cover and turned something on. The standby light glowed. Closely observed, it was not a completely steady glow. There were the faintest possible variations of brightness. But there was no impression of life.

Graves said:

"Why doesn't it flicker like the others?"

"No habits," said the sergeant. "No experience. It's like a newborn baby. It'll get to have personality after it's worked a while. But not now."

He went across the shop again. He moved out a heavy case, and twisted the release, and eased out a communicator of the same type—Mark IV—as Betsy back in the Communications room. Howell went to help him. Graves tried to assist. Lecky moved other things out of the way. They were highly eminent scientists, and Metech Sergeant Bellevs was merely a non-commissioned officer in the armed forces. But he happened to have specialized information they had not. Quite without condescension they accepted his authority in his own field, and therefore his equality. As civilians they had no rank to maintain, and they

disagreed with each other—and would disagree with the sergeant—only when they knew why. Which was one of the reasons why they were eminent scientists.

Sergeant Bellegs brought out yet another box. He unrolled cables. He selected machines whose flickering lights seemed to bespeak eagerness to be of use. He coupled them to the newly unboxed machines, whose lights were vaguely steady.

"Training cables," he said over his shoulder. "You get one machine working right, and you hook it with another, and the new machine kinda learns from the old one. Kinda! But it ain't as good as real experience. Not at first."

Presently the lights of the newly energized machines began to waver in somewhat the manner of the ready-for-operation ones. But they did not give so clear an impression of personality.

"Look!" said Sergeant Bellegs abruptly. "I got to check with you. The more I think, the more worried I get."

"You begin to believe the broadcasts come from the future?" demanded Graves. "And it worries you? But they do not speak of Mahon units—"

"I don't care where they come from," said the sergeant. "I'm worryin' about what they are! The guy in the broadcast—not knowing Mahon units—said we'd have to make half a dozen transmitters so they'd take over one after another as they blew out. You see what that means?"

Lecky said crisply:

"You pointed it out before. There is something in the wave-type which—you would say this, Sergeant!—which machines do not like. Is that the reasoning?"

"Uh-uh!" The sergeant scowled. "Machines work by the golden rule. They try to do unto you what they want you to do unto them. Likes an' dislikes don't matter. I mean that there's something about that wave-type that machines *can't* take! It busts them. If it sort of explodes surges of current in 'em— Look! Any running machine is a dynamic system in a object. A jet-plane operating is that. So's a water-spout. So's a communicator. But if you explode surges of heavy current in a dynamic system in a operating machine—things get messed up. The operating habit is busted to hell. I'm saying that if this wave-type makes crazy surges of current start up—why—if

the surges are strong enough they'll bust not only a communicator but a jet-plane. Or a water-spout. Anything! See?"

Lecky blinked and suddenly went pale.

"But," said Howell reasonably, "you said that Betsy handled it. Especially well when linked with other Mahon machines."

"Yeah," said the sergeant.

"I think," observed Graves jerkily, "that you are preparing new machines, without developed — personalities, because you think that if they make this special-type wave they'll be broken."

"Yeah," said the sergeant, again. "The signal Betsy was amplifyin' coulda been as little as a micro-micro-watt. At its frequency an' type, she'd choke it down if it was more. But even a micro-micro-watt bothered Betsy until she got Al and Gus to help. She was fair screamin' for somebody to come help her hold it. But the three of them done all right."

Howell conceded the point.

"That seems sound reasoning."

"But you don't broadcast with a micro-micro-watt. You use a hell of a lot more power than that! The transmitter the guy in the screen said to

make was a twenty-kilowatt job. Not too much for a broadcast of sine waves, but a hell of a lot to be turned loose, in waves that have Betsy hollerin' at the power she was handlin'!"

"It might break even the Mahon machines in this installation?" demanded Howell.

"You're gettin' warm," said the sergeant.

Graves said:

"You mean it might break all operating communicators in a very large area?"

"You're gettin' hot," said the sergeant grimly.

Lecky wetted his lips.

"I think," he said very carefully, "that you suspect it is a wave-type which will break any dynamic system, in any sort of object a dynamic system can exist in."

"Yeah," said the sergeant. He waited, looking at Lecky.

"And," said Lecky, "not only operating machines are dynamic systems. Living plants and animals are, too. So are men."

"That's what I'm drivin' at," said Sergeant Bellevs.

"So you believe," said Lecky, very pale indeed, "that we have been given the circuit-diagram of a transmitter which will broadcast a wave-type which destroys dynamic systems—life as well as the

operation of machines. Persons—in the future or an alien creature in a space-ship, or perhaps even the Compubs—are furnishing us with designs for transmitters of death, to be linked together so that if one fails the others will carry on. And they lure us to destroy ourselves by lying about who they are and what they propose."

"They're lyin'," said the sergeant. "They say they're in the future and they don't know a thing about Mahon units. Else they'd use 'em."

Lecky wetted his lips again.

"And—if they are not in the future, they are trying to get us to destroy ourselves because that would be safer and surer than trying to destroy us by—say—transmitters of death dropped upon us by parachute. Yet if we do not destroy ourselves, they will surely do that."

"If we don't bump ourselves off, it'll be because we got wise," acknowledged the sergeant. "If we get wise, we could bump them off by parachute-transmitter. So they'll beat us to it. They'll have to!"

"Yes," said Lecky. "They'll have to. It has always been said that a death-ray was impossible. This would be a death-broadcast. If we do not broadcast, they will—whoever

they are. It is—" He smiled mirthlessly at the magnitude of his understatement. "It is urgent that we do something. What shall we do, Sergeant?"

A squadron of light tanks arrived at Research Installation 83 that afternoon, with a shipment of courier motorcycles. They had been equipped with Mahon units and went to the post to be trained.

The Pentagon was debating the development of a Mahon-modified guided missile, and a drone plane was under construction. But non-military items also arrived for activation and test. Automatic telephone switching systems, it appeared, could be made much simpler if they could be trained to do their work instead of built so they couldn't help it.

Passenger-cars other than jeeps showed promise. It had long been known that most accidents occurred with new cars, and that ancient jalopies were relatively safe even in the hands of juvenile delinquents. It was credible that part of the difference was in the operating habits of the cars.

It appeared that humanity was upon the threshold of a new era, in which the value of personality would reappear among the things taken for

granted. Strictly speaking, of course, Mahon machines were not persons. But they reflected the personalities of their owners. It might again seem desirable to be a decent human being if only because machines worked better for them.

But it would be tragic if Mahon machines were used to destroy humankind with themselves! Sergeant Bellews would have raged at the thought of training a Mahon unit to guide an atom bomb. It would have to be—in a fashion—deceived. He even disliked the necessity he faced that afternoon while a courier winged his way to the Pentagon with the top-secret tapes Betsy and Al and Gus had made.

The Rehab Shop was equipped not only to recondition machines but to test them. One item of equipment was a generator of substitute broadcast waves. It could deliver a carrier-wave down to half a micro-micro-watt of any form desired, and up to the power of a nearby transmitter. It was very useful for calibrating communicators. But Sergeant Bellews modified it to allow of variations in type as well as frequency and amplitude.

"I'm betting," he grunted,

"that there's different sorts of the wave-type those guys want us to broadcast. Like there's a spectrum of visible light. If we were color-blind and yellow'd bust things, they'd transmit in red that we could see, and they'd tell us to broadcast something in yellow that'd wipe us out. And we wouldn't have sense enough not to broadcast the yellow, because we wouldn't know the difference between it and red until we did broadcast. Then it'd be too late."

Howell watched with tight-clamped jaws. He had committed himself to the authenticity of the broadcasts claiming to be from a future time. Now he was shaken, but only enough to admit the need for tests. Graves sat unnaturally still. Lecky looked at Sergeant Bellews with a peculiarly tranquil expression on his face.

"Only," grunted the sergeant, "it ain't frequency we got to figure, but type. Nobody hardly uses anything but sine waves for communication, but I got to make this gadget turn out a freak wave-type by guess and golly. I got a sort of test for it, though."

He straightened up and connected a cable from the generator to the Mark IV com-

municator which was a factory twin of Betsy.

"I'm gonna feed this communicator half a micro-micro-watt of stuff like the broadcast—I think," he announced grimly. "I saw the diagrams of the transmitters they want us to make. I'm guessing the broadcast-wave they use is close to it but not exact. Close, because it's bad for machines. Not exact, because they're alive while they use it. I hope I don't hit anything on the nose. Okay?"

Lecky said gently:

"I have never been more frightened. Go ahead!"

Sergeant Bellews depressed a stud. The communicator's screen lighted up instantly. It was receiving the generator's minute output and accepted it as a broadcast. But the signal was unmodulated, so there was no image nor any sound.

The communicator's standby light flickered steadily.

Sergeant Bellews adjusted a knob on the generator. The communicator's standby flicker changed in amplitude. Bellews turned the knob back. He adjusted another control. The standby light wavered crazily.

Graves said nervously:

"I think I see. You are trying to make this communicator react as Betsy did. When

it does, you will consider that your generator is creating a wave like the broadcasts from nowhere."

"Yeah," said Bellews. "It ain't scientific, but it's the best I can do."

He worked the generator-controls with infinite care. Once the communicator's standby light approached sine-wave modulation. He hastily shifted away from the settings which caused it. He muttered:

"Close!"

Then, suddenly, the communicator's lamp began to waver in an extraordinary, hysterical fashion. Sergeant Bellews turned down the volume swiftly. He wiped sweat off his forehead.

"I—I think I got the trick," he said heavily. "It's a hell of a wave-type! Are you guys game to feed it into this communicator's output amplifier?"

"I have six sets of cold chills running up and down my spine," said Lecky. "I think you should proceed."

Howell said angrily:

"It's got to be tried, hasn't it?"

"It's got to be tried," acknowledged Sergeant Bellews.

He shifted the generator's cable from the communicator's input to the feed-in for preamplified signal. The com-

municator's screen went dark. It no longer received a simulated broadcast signal. It was now signalling—calling. But the instant the new signal started out, the standby light flickered horribly. Sergeant Bellews grimly plugged in other machines—to the three scientists they looked like duplicates of Gus and Al—to closed-circuit relationship with Betsy's twin. The standby light calmed.

"Now we test," he said grimly. "Got a watch?"

Lecky extended his wrist.

"Watch it," said Sergeant Bellews.

He stepped up the output.

"My watch has stopped," said Lecky, through white lips.

Graves looked at his own watch. He shook it and held it to his ear. He looked sick. Howell growled and looked at his own.

"That wave stops watches," he admitted unwillingly.

"But not Mahon machines easy," said Sergeant Bellews heavily, "and not us. There was almost three micro-micro-watts goin' out then. That's three-millionths of a millionth of an ampere-second at one volt. We—"

His voice stopped, as if with a click. The screen of Betsy's factory-twin communicator

lighted up. A man's face peered out of it. He was bearded and they could not see his costume, but he was frightened.

"*What—what is this?*" cried his voice shrilly from the speakers.

Sergeant Bellews said very sharply:

"Hey! You ain't the guy we've been talking to!"

The screen went dark. Sergeant Bellews put his hand over the microphone opening. He turned fiercely upon the rest.

"Look!" he snapped. "We were broadcastin' their trick wave—the wave they used to talk to us! And they picked it up! But they weren't expectin' it! They were set to pick up the wave they told us to transmit! See? That guy'll come back. He's got to! So we got to play along! He'll want to find out if we got wise and won't broadcast ourselves to death! If he finds out we know what we're doin', they'll parachute a transmitter down on us before we can do it to them! Back me up! Get set!"

He removed his hand from the microphone.

"Callin' 2180!" he chattered urgently. "Calling the guy that just contacted us! Come in, 2180! You're not the guy we've been talking to, but come in! Come in, 2180!"

Howell said stridently:

"But if that's 2180, how'd we parachute—"

Lecky clapped a hand over his mouth with a fierceness surprising in so small a man. He whispered desperately into Howell's ear. Graves absurdly began to bite his nails, staring at the communicator-screen. Sergeant Bellews continued his calling, ever more urgently.

His voice echoed peculiarly in the Rehab Shop. It seemed suddenly a place of resonant echoes. All the waiting, repaired, or to-be-rehabilitated machines appeared to listen with interest while Sergeant Bellews called:

"Come in, 2180! We been trying to reach you for a couple weeks! We got somebody else instead of you, and they been talkin' to us, and they say that they're 3020 instead of 2180, but we've got to contact you! They don't know anything about that germ that's gonna mutate and bump us off! It's ancient history to them. We got to reach you! Come in, 2180!"

The flickering yellow lights of the machines wavered as if all the quasi-living machines were listening absorbedly. The Rehab Shop was full of shadows. And Sergeant Bellews sat before the dark-screened

communicator with sweat on his face, calling cajolingly to nothingness to come in.

After five minutes the screen grew abruptly bright again. The brisk, raceless broadcaster of the earlier broadcast—not the bearded man—came back. He forced a smile:

"Ah! 1972! At last you reach us! But we did not hope you could make your transmitters so soon!"

"We tried to analyze your wave," said Sergeant Bellews, with every appearance of feverish relief, "but we only got it approximate. We tried callin' back with what we got, and we got through time, all right, but we contacted some guys in 3020 instead of you! We need to talk to you!— Can you give me the stuff about that bug that's gonna wipe out half of us? Quick? I got a recorder goin'."

The completely uncharacterizable man in the screen forced a second smile. He held something to his ear. It would be a tiny sound-receiver. Obviously the contact in time or place or nowhere was being viewed by others than the one man who appeared. He was receiving instructions.

"Ah!" he said brightly, *"but now that you have the*

contact, you will not lose it again! Leave your controls where they are, and our learned men will tell your learned men all that they need to know. But—3020? You contacted 3020? That is not in our records of your time!"

He listened again to the thing at his ear. His expression became suddenly suspicious, as if someone had ordered that as well as the words which came next.

"We do not understand how you could contact a time a thousand years beyond us. It is possible that you attempt a joke. A—a kid, as you would say."

Sergeant Bellews beamed into the screen which so remarkably functioned as a transmitting-eye also.

"Hell!" he said cordially. "You know we wouldn't kid you! You or our great-great-great-grandchildren! We depend on you! We got to get you to tell us how not to get wiped out! In 3020 the whole business is forgotten. It's a thousand years old, to them! But they're passin' back some swell machinery—"

He turned his head as if listening to something the microphone could not pick up. But he looked appealingly at Lecky. Lecky nodded and

moved toward the communicator.

"Look!" said Sergeant Bellews into the screen. "Here's Doc Lecky—one of our top guys. You talk to him."

He gave his seat to Lecky. Out of range of the communicator, he mopped his face. His shirt was soaked through by the sweat produced by the stress of the past few minutes. He shivered violently, and then clamped his teeth and fumbled out sheets of paper. He beckoned to Graves. Graves came.

"We—we got to give him a doctored circuit," whispered Sergeant Bellews desperately, "and it's got to be good—an' quick!"

Graves bent over the paper on which the sergeant dripped sweat. The sergeant murmured through now-chattering teeth what had to be devised, and at once. It must be the circuit-diagram for a transmitter to be given to the man whose face filled the screen. The transmitter must be of at least twenty-kilowatt power. It must be such a circuit as nobody had ever seen before.

It must be convincing. It should appear to radiate impossibly, or to destroy energy without radiation. But it must actually produce a broadcast

signal of this exotic type—here the sergeant described with shaky precision the exact constants of the wave to be generated—and the broadcaster from nowhere must not be able to deduce those constants or that wave-type from the diagram until he had built the transmitter and tried it.

"I know it can't be done!" said the sergeant desperately. "I know it can't! But it's gotta be! Or they'll parachute a transmitter down on us sure."

Graves smiled a quick and nervous smile. He began to sketch a circuit. It was a wonderful thing. It was the product of much ingenuity and meditation. It had been devised—by himself—as a brain-teaser for the amusement of other high-level scientific brains. Mathematicians zestfully contrive problems to stump each other. Specialists in the higher branches of electronics sometimes present each other with diagrammed circuits which pretend to achieve the impossible. The problem is to find the hidden flaw.

Graves deftly outlined his circuit and began to fill in the details. Ostensibly, it was a circuit which consumed energy and produced nothing—not even heat. In a sense it was the exact opposite of

a perpetual-motion scheme, which pretends to get energy from nowhere. This circuit pretended to radiate energy to nowhere, and yet to get rid of it.

Presently Lecky could be heard expostulating gently:

"But of course we are willing to give you the circuit by which we communicate with the year 3020! Naturally! But it seems strange that you suspect us! After all, if you do not tell us how to meet the danger your broadcasts have told of, you will never be born!"

Sergeant Bellews mopped his face and moved into the screen's field of vision.

"Doc," he said, laying a hand on Lecky's arm. "Doc Graves is sketchin' what they want right now. You want to come show it, Doc?"

Graves took Lecky's place. He spread out the diagram, finishing it as he talked. His nervous, faint smile appeared as the mannerism of embarrassment it was.

"There can be no radiation from a coil shaped like this," he said embarrassedly, "because of the Werner Principle. . . . Yet on examination . . . input to the transistor series involves . . . energy must flow . . . and when this coil . . ."

His voice flowed on. He explained a puzzle, presenting it diffidently as he had presented it to other men in his own field. Then he had been playing—for fun. Now he played for perhaps the highest stakes that could be imagined.

He completed his diagram and, smiling nervously, held it up to the communicator-screen. It was instantly transmitted, of course. To nowhere. Which was most appropriate, because it pretended to be the diagram of a circuit sending radiation to the same place.

The face on the screen twitched, now. The hand with the tiny earphone was always at the ear of the man on the screen, so that he plainly did not speak one word without high authority.

"We will—examine this," he said. His voice was a full two tones higher than it had been. *"If you have been—truthful we will give you the information you wish."*

Click! The screen went dark. Lecky let out his breath. Sergeant Bellews threw off the transmission switch. He began to shake. Howell said indignantly:

"When I make a mistake, I admit it! That broadcast isn't from the future! If it hadn't been a lie, he'd have known he

had to tell us what we wanted to know! He couldn't hold us up for terms! If he let us die he wouldn't exist!"

"Y-yeah," said Sergeant Bellews. "What I'm wonderin' is, did we fool him?"

"Oh, yes!" said Graves, with diffident confidence. "I don't know but three men in the world who could find the flaw in that circuit." He smiled faintly. "But it radiates all the energy that's fed into it." He turned to Sergeant Bellews. "You gave me the constants of a wave you wanted it to radiate. I fixed it. It will. But why that special type—that special wave?"

Sergeant Bellews pulled himself together.

"Because," he said grimly, "that was the wave they wanted us to broadcast. What I'm hoping is that you gave 'em a transmitter to do exactly the same thing as the one they designed for us. If they're fooled, they'll broadcast the wave they told us to broadcast. If it busts machines, it'll bust their machines. If it stops all dynamic systems dead—including men—they'll be stopped dead, too." Then he looked from one to another of the three scientists, each one reacting in his own special way. "Personally," said Sergeant Bellews doggedly, "I'm goin'

to have a can of beer. Who'll join me?"

The world wagged on. The automatic monitors in Communications Center reported that another broadcast had been received by Betsy and undoubtedly unscrambled by Al and Gus, working as a team. The reported broadcast was, of course, an interception of the two-way talk from the Rehab Shop.

The tall young lieutenant, working with his eyes kept conscientiously shut, extracted the tapes and loaded them in a top-security briefcase. A second courier took off for Washington with them. There a certified, properly cleared major-general had them run off, and saw and heard every word of the conversation between the Rehab Shop and—nowhere. He howled with wrath.

Sergeant Bellews went into the guardhouse while plane-loads of interrogating officers flew from Washington. Howell and Graves and Lecky went under strict guard until they could be asked some thousands of variations of the question, "Why did you do it?" The high brass quivered with fury. They did not accept decisions made at non-commissioned-officer level.

Communication with their great - great - great - grand-children, they considered, should have been begun with proper authority and under high-ranking auspices. They commanded that 2180 should immediately be re-contacted and properly authorized and good-faith conference begun all over again. The only trouble was that they could get no reply.

The dither was terrific and the tumult frantic. When, moreover, even Betsy remained silent, and Al and Gus had nothing to unscramble, the high brass built up explosive indignation. But it was confined to top-security levels.

The world outside the Pentagon knew nothing. Even at Research Installation 83 very, very few persons had the least idea what had taken place. The sun shone blandly upon manicured lawns, and the officers' children played vociferously, and washing-machines laundered diapers with beautiful efficiency, and vacuum cleaners and Mahon-modified jeeps performed their functions with an air of enthusiastic contentment. It seemed that a golden age approached.

It did. There were machines which were not merely possessions. Mahon-modified ma-

chines acquired reflections of the habits of the families which used them. An electric icebox acted as if it took an interest in its work. A vacuum cleaner seemed uncomfortable if it did not perform its task to perfection. It would seem as absurd to exchange an old, habituated family convenience as to exchange a member of the family itself. Presently there would be washing-machines cherished for their seeming knowledge of family-member individual preferences, and personal fliers respected for their conscientiousness, and one would relievedly allow an adolescent to drive a car if it were one of proven experience and sagacity. . . .

The life of an ordinary person would be enormously enriched. A Mahon-modified machine would not even wear out. It took care of its own lubrication and upkeep—giving notice of its needs by the behavior of its standby-lamp. When parts needed replacement one would feel concern rather than irritation. There would be a personal relationship with the machines which so faithfully reflected one's personality.

And the machines would always, always, always act to-

ward humans according to the golden rule.

But meanwhile the Rehab Shop was taken over by officers of rank. They tried frantically to resume the communication that had been broken off. Suspecting that Sergeant Bellews had shifted controls, they essayed to shift them back. The communicator which was Betsy's factory twin went into sine-wave standby-modulation, and suddenly smoked all over and was wrecked. The wave-generator went into hysterics and produced nothing whatever. Then there was nothing to do but pull Sergeant Bellews out of the clink and order him to do the whole business all over again.

"I can't," said Sergeant Bellews indignantly. "It can't be done. Those guys are busy buildin' a transmitter according to the diagram Doc Graves gave them. They won't pay no attention to anything until they'd tried to chat with their great - great - great - grandchildren in 3120. They were phonys, anyhow! Pretendin' to be in 2180 and not knowin' what Mahon units could do!"

Lecky and Graves and Howell were even less satisfactory. They couldn't pretend even to try what the questioning-teams from the Pentagon

wanted them to do. And Betsy remained silent, receiving nothing, and Gus and Al waited meditatively for something to unscramble, and nothing turned up.

And then, at 3:00 P.M. Greenwich mean time, on August 9, 1972, nearly every operating communicator in the fringe of free nations around the territory of the Union of Communist Republics — all communicators blew out.

There were only four men in the world who really knew why—Sergeant Bellews and Lecky and Graves and Howell. They knew that somewhere behind the Iron Curtain a twenty-kilowatt transmitter had been turned on. It produced a wave of the type and with the characteristics that would have been produced by a transmitter built from the diagram sent through Betsy and Al and Gus for people in the United States to build. Obviously, it had been built from Graves' diagram broadcast to somewhere else and it broadcast what the United States had been urged to broadcast.

It blew itself out instantly, of course. The wave it produced would stop any dynamic system at once, including its own. But it hit Stockholm and traffic jammed as the dynamic

systems of cars in operation were destroyed. In Gibraltar, the signal-systems of the Rock went dead. All around the fringe of the armed Communist republics machines stopped and communications ended and very many persons with heart conditions died very quietly. Because their dynamic systems were least stable. But healthy people—like Mahon-modified machines—had great resistance . . . outside the Iron Curtain.

There was, though, almost a vacuum of news and mechanical operations at the rim of a nearly perfect circle some four thousand miles in diameter, whose center was in a Compub research installation.

It was very bad. Such a panic as had never been known before swept the free world. Some mysterious weapon, it was felt, had been used to cripple those who would resist invasion, and the Compub armed forces would shortly be on the march, and Armageddon was at hand. The free world prepared to die fighting.

But war did not come. Nothing happened at all. In three days there were sketchy communications almost everywhere outside that monstrous circle of silence. But nothing came out of that circle. Nothing.

In two weeks, exploring parties cautiously crossed the barbed-wire frontier fences to find out what had happened. Those who went farthest came back shaken and sick. There were survivors in the Compubs, of course. Especially near the fringes of the circle. There were some millions of survivors. But there was no longer a nation to be called the Union of Communist Republics. There were only frightened, starving people trudging blindly away from cities that were charnel-houses and machines that would not run and trees and crops and grasses that were stark dead where they stood. It would be a long time before anybody would want to cross those lifeless plains and enter the places which once had been swarming hives of homes and people.

And presently, of course, Sergeant Bellews was let out of the guardhouse. He could not be charged with any crime. Nor could Graves nor Lecky nor Howell. They were asked, confidentially, to keep their mouths shut. Which they would have done anyhow. And Sergeant Bellews was asked with reluctant respectfulness, just what he thought had really happened.

"Some guys got too smart," he said, fuming. "A guy that'll broadcast a wave that'll wreck machines . . . I haven't got any kinda use for him! Dammit, when a machine treats you accordin' to the golden rule, you oughta treat it the same way!"

There were other, also-respectful questions.

"How the hell would I know?" demanded Sergeant Bellews wrathfully. "It coulda been that we did make contact with 2180, and they were smart an' told the Compubs to try out what we told 'em. But I don't believe it. It coulda been a kinda monster from some other planet wanting us wiped out. But he learned him a lesson, if he did! And o' course, it coulda been the Compubs themselves, trying to fool us into committing suicide so they'd—uh—inherit the earth. I wouldn't know! But I bet there ain't any more broadcasts from nowhere!"

He was allowed to return to the Rehab Shop, and the flickering standby lights of many Mahon - modified machines seemed to glow more warmly as he moved among them.

And he was right about there not being any more broadcasts from nowhere.

There weren't.

Not ever.

THE END

The science fiction writer snaps his fingers. "Hyperspace," he retorts. "I can send a ship into super-light overdrive and leave this continuum for a different dimensional coordinate system. In hyperspace my ship can travel at any speed I like. I can get my hero to Aldebaran VI just in time to win a battle . . . or just late enough to allow the heroine to have been abducted by the tarantula people . . ."

The physicist shakes his head. "Gibberish. You just invented hyperspace as a convenience."

"Not me," the writer counters. "The mathematicians did. And anyway, since you can't prove that I'm wrong, the idea is still useful. Science fiction can always use science that hasn't been proved to be wrong. Right?"

Muttering something about the conservation of energy, the physicist sinks back into his chair.

Distance and the Barrier

THE physicist has good cause to be upset," the engineer says. "Although it seems that flight through the solar system is a problem that can be licked by engineering, flight to the stars is an altogether different proposition. The distances involved are on the order of millions of times larger than inter-

planetary distances—which themselves are measured in the millions and even billions of miles."

The astronomer takes over the conversation and points out that light, travelling at an unvarying vacuum speed of 186,000 miles per second, goes some 93 million miles from the Sun to Earth in about eight minutes. To get from the Sun to Jupiter—about 483 million miles—light takes slightly more than 40 minutes. And it takes light about five hours to span the three-billion-mile distance between the Sun and Pluto. But to reach Alpha Centauri takes light 4, 3 years. Sirius, the brightest star in Earth's night sky, is some eight lightyears away. Giant Rigel is about 300 lightyears distant. "Far more than clever engineering is required to conquer distances such as these," the astronomer concludes. "And light-speed seems to be a fundamental barrier."

"That's right," the physicist agrees. "Nothing in the universe has been observed to travel faster than light. Probably nothing can."

The science fiction writer frowns. "The 'light barrier' sounds something like the 'sound barrier' that the engineers broke through some 15 years ago."

All the scientists groan in protest. The engineer explains that

the speed of sound was known to be no fundamental barrier. The problem was that a plane flying at the speed of sound (Mach 1) generates a shock wave. The shock wave compresses the air ahead of it—piles it up in a thickening blanket. The effect is something like trying to fly through a not-quite-solid wall. But eventually planes were designed—and powered—to fly through the “sound barrier” and trail the shock wave behind them. (It is the shock wave generated continuously by a plane in supersonic flight that people on the ground hear as a “sonic boom.” The boom does not occur only when the plane goes past Mach 1.)

The speed of light, though, is an altogether different matter, the physicist says. Indeed, theoretical considerations state that nothing can exceed the speed of light. It is a fundamental barrier. Near lightspeed, the basic physical relationships among matter, energy and time change so radically that the delicate balances of human biochemistry perhaps would not survive.

For example, in some of the powerful synchrotrons, electrons have been accelerated to within a few percent of the speed of light. At these speeds, when more energy is imparted to the electron, its velocity does not increase appreciably. But its mass

grows! No matter how much energy is pumped into the electron, it never reaches the speed of light. The energy changes into mass.

Tinkering with Time

AS the physicist stops to take a sip of coffee, the mathematician says, “Even though the physicist and engineer cannot build you a ship that goes as fast as light, I can show you what would happen if such a ship existed.”

“You can?” asks the science fiction writer.

“Of course,” the mathematician replies, a trifle smugly. “Please remember that a mathematician named Newton showed 300 years ago that an artificial satellite could be established in orbit. Mathematicians can tell you what the stars will look like a thousand years from now, or what interactions a mu-meson will undergo in its first millionth of a second of lifetime, or . . .”

“Okay, okay,” says the science fiction writer. “What about lightspeed ships?”

First, the mathematician says, it is not necessary to travel exactly at the speed of light. If a ship came to within a few percent of light-speed, relativistic effects would dominate. The mathematics of relativity tell us that as a ship approaches light speed, time aboard the ship

slows down. A clock on the ship would tick slower and slower as the speed came closer to that of light. Everything aboard the ship—human biochemistry included—would slow down with respect to time on Earth. But aboard the ship itself, nothing would seem to change. Everything would seem normal, even though years might pass on Earth before a second elapses aboard the ship.

This is the basis of the famous "twin paradox" of relativity. If one brother stays on Earth while his twin flies to a star at nearly the speed of light, the flying twin will return to Earth younger than the brother he left behind. The German mathematician, Eugene Sänger, gives the following example: A ship flying at more than 90% of the speed of light travels 1000 lightyears to Polaris, the North Star. Ignoring such trivial details as time spent accelerating up to top speed and decelerating to landing speed again, the ship could make the flight to Polaris and back to Earth in a subjective time of 20 years, roundtrip. But when it returns to Earth, our planet will have aged slightly more than 2000 years!

"Still," says the science fiction writer, somewhat subdued but not beaten yet, "if we could fly at speeds close to light-speed, we could reach the stars. There's no

necessity of breaking the 'light barrier' to get to the stars."

"Not to *the* stars," says the astronomer, with a heavy countenance. "Just to a handful of stars, a mere handful. Even at light-speed, the stars are too far away."

The mathematician disagrees. "Come now, astronomer. Sänger showed that you could circumnavigate the entire universe in a subjective time of only about 40 years, if you fly at 99% the speed of light."

"And return to an Earth that is five billion years older than when you left it," the astronomer counters. "Who would engage on such a venture? How could you know the Earth would still exist after such a time?" The astronomer goes on to demonstrate the problem. Within a radius of roughly 16 lightyears from the Sun there are 40 stars (some of which are double and triple systems). If one could travel at the speed of light, roundtrips to the closest star—Alpha Centauri—would take more than eight Earth-years, from start to finish of the journey, regardless of the subjective elapsed time aboard ship. When the ship returned to Earth from Alpha Centauri, more than eight years would have elapsed on Earth. To reach the farthest of these stars, explorers would be away from Earth for a total of

more than 32 years. The explorers themselves might not age quite 32 years on the expedition, but their wives and families and associates would be more than 32 years older when the expedition returned to Earth.

SO far we have been talking about stars in the Sun's immediate neighborhood. Now look at the whole picture. We said earlier that Rigel is about 300 lightyears away, and Polaris, 1000 lightyears. Already you can see that, even if a man travelled at light-speed, he would have to bid a final farewell to the Earth he knows before sailing off. It is as though Columbus had left Spain in 1492 and returned in 1800—just in time for the Napoleonic wars. Or if Lief Erikson had departed from Scandinavia around 1000 A.D. and would not return until 3000 A.D.

And Rigel and Polaris are still relatively close to the Sun! Consider the size of the Milky Way galaxy. The Sun is some 25,000 lightyears from its center. The galaxy is about 100,000 lightyears in diameter, and some 30,000 lightyears thick at its widest part. It contains about 100 billion stars, with enough free gas and dust between the stars to build about another 100 billion. And the Milky Way is only one galaxy out of billions that have been observed. The

nearest are the Magellanic Clouds, small satellite galaxies of our Milky Way, some 150,000 lightyears away. The closest spiral galaxy is M 31 in Andromeda, about two million lightyears from us. Galaxies have been seen at distances of six to eight billion lightyears.

"That's enough," the science fiction writer protests, slightly green in the face. "I'm willing to confine my stories to the Milky Way. A hundred billion stars seems good enough for the time being."

"Do you seriously think," the astronomer asks, "that reasonable men would want to fly to distant stars and return to an Earth on which centuries or even millenia had passed? I doubt it."

The writer is silent for a long moment. Finally he asks softly, "What about hyperspace?"

The Other Side of the Barrier

"Hyperspace is a mathematical invention," the mathematician says, then adds, "Unfortunately, like so much of mathematics, it does not necessarily have any relation to the real world. There is no reason to assume that the three dimensions of space that we can experience—length, breadth, and height—are the only ones in existence. We already consider time as a fourth dimension, but not a spa-

tial one. There could be other dimensions, unknown to man."

"Sure," the science fiction writer says, brightening. "And maybe we'll find out about them once we're out in space. After all, what we know about the universe is pretty pitiful, as long as we're confined to this one planet."

The mathematician agrees, but then points out that additional dimensions do not necessarily make it easier to fly to the stars. "In science fiction stories, travel through hyperspace is always quicker than travel through ordinary three-dimensional space. But why should this be true? It could just as easily be longer. And a question that has always intrigued me was: how do you navigate in hyperspace?"

The science fiction writer looks so perplexed that the mathematician decides to cheer him up.

"Although hyperspace may not be the boon to interstellar travel that it has been cracked up to be, I think I can show you what it would be like if you *could* break through the 'light barrier.'"

"But I thought that's impossible."

"It may well be," the mathematician admits, "to the physicist. But to a mathematician, the speed of light is just another speed. Higher speeds can be postulated, mathematically. Re-

member, mathematics need not deal with the real world all the time.

"The mathematician R. T. Jones has investigated the kinematics of faster-than-light travel. You recall that as one goes faster and faster, approaching the speed of light, subjective time slows down; the twin aboard ship ages more slowly than the twin on Earth. At exactly the speed of light, subjective time seems to vanish. The flying twin can go any distance instantaneously, it seems to him. But to the twin on Earth, of course, his brother is flying at light-speed; it takes 10 years to cover a distance of 10 lightyears. Now, as the flying twin *exceeds* the speed of light, time begins to speed up again for him. At nearly twice light-speed, subjective time aboard ship is exactly equal to elapsed time on Earth. At infinite speed, subjective time aboard ship is equal to the light time.

"Thus, you have an even stranger 'twin paradox.' If a ship can travel infinitely fast, it could fly to Polaris and return in *zero time*—from the standpoint of the twin remaining on Earth. But the twin in the ship would age 2000 years!

"He'd be dead of old age before he got halfway there," the science fiction writer says gloomily, "even though it would seem

on Earth as though he made it to Polaris and back instantaneously."

A polite cough from the other side of the table turns everyone's head toward the biochemist. "Perhaps your faster-than-light twin can make it after all. Why can't you slow down his metabolic rate so that he doesn't age at all during the flight?"

"Suspended animation?"

With a slightly uncomfortable look, the biochemist says, "You could call it that. I'm sure that by the time we're ready to tackle the stars, a technique will have been found to freeze a human being indefinitely. You could freeze the twin at takeoff and revive him when he arrives at Polaris. Subjectively—and physically—he won't be one minute older than when he took off."

"Then that's it!" the science fiction writer exclaims. "With a ship that flies at infinite speed, and suspended animation, a man can go anywhere in zero elapsed time!"

The mathematician and biochemist agree with the broadly-smiling writer. But the physicist raises a heavy hand of objection:

"All this would be true," he says, "if you could fly faster than light, I agree. But I must point out that, as far as physics can determine, you cannot ex-

ceed—you cannot even reach—the speed of light."

Interstellar Engineering

"All right, then," the science fiction writer says, at last. "Let's change our tack. Let's stick to what we know can be actually engineered. No new scientific discoveries—no faster-than-light travel. Can man still reach the stars, and if so, how?"

"Well," says the engineer, "there's always the old interstellar ark. You know, a huge ship with a completely self-sufficient colony aboard. They'd sail out to the stars at speeds not much greater than solar escape velocity. It would take generations and generations, but they could get there eventually."

The psychiatrist lifts his eyebrows. "I doubt that normal, well-adjusted human beings would ever embark on such a journey. How could they, in good conscience, doom several generations of their offspring to live and die aboard the ark? How do they know that the generation that eventually reaches the destination star will want to live there?"

"Or," the physicist adds, "that another group, in a faster ship, hasn't beaten them to it?"

"Even leaving that possibility aside," the psychiatrist continues, "no group of human beings who could be considered normal

would ever contemplate such a mission. Why, they would have to be a group of exiles. Or religious fanatics."

The science fiction writer muses thoughtfully, "Not bad ideas for a story or two."

The engineer asks, "Would you consider a rocket system based on hydrogen fusion power within the rules of the game we're now playing?"

"No one has built a successful fission rocket yet," the physicist points out. "And the only method of liberating fusion energy known to man at present is the H-bomb."

"I know," the engineer admits. "But, in principle, at least, we know that we will someday be able to harness fusion power. It will make a tremendous propulsion system."

The engineer goes on to explain about a study undertaken by Dwain F. Spencer and Leonard D. Jaffe of the California Institute of Technology's Jet Propulsion Laboratory. Assuming that fusion rockets can be built, they conclude that a five-stage vehicle—using fusion power in every stage—could make a round-trip flight to Alpha Centauri in a total elapsed Earth time of 29 years. The ship would accelerate at 1 *g* for a few months until it reached relativistic velocity, then coast most of the way to Alpha Centauri,

where it would decelerate to orbital speed. The same procedure would be followed for the return trip.

"The 29 years would seem shorter to the men making the flight, of course," the engineer says.

"And that's using power that we know we can harness," the writer enthuses. "No need to call in anti-matter or space warps. Why, maybe by the end of the century we can reach Alpha Centauri!"

"Excuse me," says the astronomer. "Have any of you ever heard of the Bussard Interstellar Ramjet?"

The Interstellar Ramjet

R. W. BUSSARD, of the Los Alamos Scientific Laboratory (the astronomer relates) has pointed out that the fusion rocket is limited in that it must carry all of its propellant mass along with it. Spencer and Jaffe's five-stage fusion rocket, for example, must be at least 90% hydrogen propellant. This means that the rocket engine spends most of its energy pushing its own propellant mass. The situation becomes a vicious circle. As long as you must carry all the rocket's propellant along with you, any increase in speed must be paid for by more propellant mass. When you are considering flight at close to the speed of

light, this becomes a serious obstacle. It poses a fundamental limitation on the energy you can get out of the fusion rocket.

But suppose the interstellar ship did not have to carry any propellant at all? Its fusion rocket could perform much more efficiently. And the ship's range would be unlimited—it could go anywhere, at close to lightspeed, as long as it could somehow find propellant and feed it to its engine.

Now, interstellar space is filled with such a propellant for a hydrogen fusion rocket: hydrogen gas. There is as much free gas in the Milky Way, by mass, as there are stars. That works out, very approximately, to 2×10^{38} metric tons (considering that there are 10^{11} stars in the Milky Way, and they are on the average of the same mass as our Sun, 2×10^{27} metric tons). While this is an enormous amount of available fuel, the interstellar gas is spread very thinly through space. In most regions of the Milky Way it can hardly be more than a few atoms per cubic centimeter (although there are many denser regions, such as the Great Nebula of Orion).

The Interstellar Ramjet, then, will need a gas-scoop of considerable—one might be tempted to say, astronomical—size. A circular funnel 2000 kilometers in

radius will be required to scoop up the tenuous gas in the normal regions of the galaxy. That is for a ship with a payload of 1000 metric tons—a trim little craft indeed. If one wishes to steer the ship through dense clouds of gas, and then coast onward between clouds, a scoop only some 60 kilometers in radius is required. The scoop, of course, can be lightly built. If only *ionized* gas is scooped, the funnel can be a magnetic field, instead of solid material. Ionized gas occurs near hot stars; it is relatively prevalent along the outer arms of the Milky Way, but probably rare at the core of the galaxy.

One can picture, then, a starship that uses the interstellar gas itself for fuel. The engineering problems of building a workable (not to mention efficient) hydrogen fusion engine are staggering. The engineering problems of building a 2000-kilometer-radius scoop are more than formidable, even though the scoop will have very little pressure on it. It will, however, be under a constant 1 *g* acceleration, since the ship will be either accelerating or decelerating at 1 *g* at all times. But these are engineering problems, not fundamental limitations. In time, they can be solved.

"Wait a minute," says the physicist. "If you accelerate con-

tinuously at 1 *g*, you will very quickly begin to run into diminishing returns. The ship's mass will increase, and additional inputs of energy will go more toward mass increase than acceleration."

The astronomer shrugs elaborately. "So what? We're getting the fuel for free. Why not continue to accelerate? Every increment in velocity helps."

"This Interstellar Ramjet can really work, then?" the writer asks, almost afraid to believe it can be true.

"It works quite well, on paper," the astronomer replies. "According to Carl Sagan, of Harvard College Observatory, the ship can reach the nearest stars in a few years—of ship time, that is. The center of the galaxy would be 21 years away, and the great spiral in Andromeda, 28 years away. Of course, the elapsed times on Earth would be tens of thousands, even millions of years."

THE biochemist says, "The trip time, as sensed by the ship's crew, could be virtually zero if you freeze the crew just after takeoff and revive them just prior to arrival at their destination."

"I must point out," the psychiatrist objects, "that you still have a basic problem of motivation on your hands. Who would

want to leave the Earth, knowing that he would return to a world several thousand years older than the one he left?"

"It would be a one-way trip, in a sense," the writer muses. "Maybe the crew members would want to bring their families with them. Once they left Earth, they could never return to the time they were born into."

"Nothing man has ever done before even comes close to that experience," the psychiatrist says.

"Oh, I'm not so sure about that," the anthropologist objects. "The Polynesians settled the islands of the central Pacific on a somewhat similar basis. Their expansion through the region was somewhat haphazard—a mixture of deliberate emigrations into the unknown plus accidental landings on new islands as the result of storms and other mishaps. But they ventured out onto the broad Pacific, which must have seemed as dark and dangerous to them as space does to us. They left their homes behind—although they usually took their immediate families. They did not expect to return at all."

"That is somewhat similar," the psychiatrist agrees.

"So we can reach the stars after all," the science fiction writer says. "It's not fundamentally impossible."

The mathematician chuckles to himself, "Goodness, we have not even been particularly imaginative. You know, the principles of relativity have only been worked out for point-masses. No one has calculated the effects of relativistic velocities on waves. I've been waiting for someone to suggest an instantaneous matter transmitter that breaks down matter into energy waves and beams the waves at infinite velocity to a receiver that reconstructs the original payload."

The physicist's glower is enough to make the science fiction writer decide to drop that subject.

"Imagine a galaxy where Interstellar Ramjets travel from star to star."

Could there be commerce between civilizations separated by lightyears of distance and time? Could there be wars between states when an attack and counterattack would be centuries or even millenia apart?

"Probably not," the writer answers his own questions. "But there could be *contacts*. People

would be forced to think and plan ahead in terms of centuries. And what an age for adventure!"

The mathematician, grinning maliciously, adds, "And if a space-traveller should deposit a few dollars in a savings account, and then return a century or two later—what an age for compound interest!"

The science fiction writer turns his beaming face to the panel of experts and thanks each one of them in turn.

"You have certainly answered my original question, gentlemen. I can now write about interstellar travel with complete confidence. My ships will be Interstellar Ramjets. My heros will be frozen during transit from star to star—why, they'll become virtually immortal! Each trip will take them ahead in time so much that they will never know what to expect at their destination. Edgar Rice Burroughs, hah! Barsoom was an old man's home compared to what the *real* world has to offer!"

THE END

ON SALE IN SEPT. FANTASTIC (July 23rd)

A BRAND NEW NOVEL by THOMAS BURNETT SWANN, **WILL-O-THE-WISP**; also new stories by LIN CARTER, **BLACK HAWK OF VALKARTH**, GORDON EKLUND, **TATTERED STARS**, TARNISHED BARS, GEO. ALEC EFFINGER, **POETS AND HUMANS**, BARRY N. MALZBERG, **HANGING**, THOMAS F. MONTELEONE, **PRESENT PERFECT**, and a new feature, by L. SPRAGUE DE CAMP, **WILLIAM MORRIS; JACK OF ALL ARTS**.

HOMESTEADS ON VENUS

By LESTER DEL REY

A whole world is going to waste for the lack of courageous, creative imagination. Here is a blow-by-blow plan of how we can start now to make Venus fit for human habitation.

THE road to space is paved with good inventions, and most of them are the ideas of science fiction writers. If there is any truth to the rumor that science has caught up with fiction, it certainly doesn't apply to the conquest of space. In fact, if it weren't for the ideas worked out by fiction writers, the current crop of so-called space scientists would be hard up for "new" developments to release to the press.

The underground dwellings being tentatively suggested by some scientists as suitable for life on the moon were worked out long ago by Campbell,

Heinlein and others. The use of bubble-cities on Mars was already old hat when Arthur C. Clarke developed it to its limit. Space stations appeared in works of fiction before the turn of the century. Of course, the science-fiction men have assimilated most of such ideas by now, though they don't quite seem to be sure of what to do with them. But in at least one major aspect of space conquest, I have yet to find one scientist who has discovered the work done in fiction.

A whole world seems to be going to waste through neglect—and that happens to be the

most important world of all for colonization. That world, of course, is Venus.

If our grandchildren are ever to start colonizing any other world in the solar system, it will almost certainly have to be Venus. The moon is apparently nothing but barren rock. Mars is an arid world, lacking sufficient oxygen for men to live in the open. All the other planets beyond Mars are obviously totally useless for our kind of life. Yet on Venus, there must be millions of square miles of land which can be turned into suitable homesites for men to live normal, productive lives, if we have the wit to begin work on the project in the immediate future. Curiously, while Venus is a hundred times as far from us as the Moon, we can begin work there even before we can hope to land our first lunar explorers.

Probably it is natural that the first suggestion for what can be done on Venus came from a woman. Katherine MacLean, in "The Fittest," beat all the male writers to the idea. But then, Venus is a female planet, like earth, and maybe it takes a lady to understand the situation. Earth and Venus, of course, are named for goddesses, while the other seven planets are named after gods. This is appropriate, too; the only way to

gain a foothold on the male planets is by a desperate fight with them. Venus, in spite of her present coy airs, needs only the proper peaceful wooing to make her settle down to give man a good home, as a dutiful wife should.

The planet is about the same size as earth, with a surface gravity that is just enough lighter to make living a bit easier. It's the nearest planet to us, and the orbits of Venus and Earth intersect much more frequently than those of Earth and Mars, making for shorter and more frequent trips. The day is pretty uncertain. We know the planet revolves, since otherwise the dark side would become so cold that all the atmosphere would freeze out there. We also know the period of revolution is longer than that of earth. It is probably somewhere between five and ten of our days in length. Awkward, but not a major problem to men, who have become independent of daylight anyhow.

BREATHING ON VENUS

The most important aspect of the planet, however, is that it has a deep, dense atmosphere. From what we can learn of the air of Venus, men couldn't breathe it now—but Katherine MacLean has suggested the

answer to this problem, and it's a beauty in ease and simplicity.

There have been a lot of theories about that atmosphere in the past. Some kind of clouds veil the whole planet in a haze and keep us from seeing either the surface or even the lower layers of air. The first idea was that these clouds were of water vapor. This made us think that Venus might be a world of steaming swamps, as the earth was in the days of the dinosaurs. But readings of the light bounced from this haze as analyzed by the spectroscope gave a much less optimistic picture. No water vapor or oxygen were found; instead, there were indications of such poisonous gases as methane and formaldehyde. (Traces of those gases are also found in the very upper layers of earth's atmosphere, which might indicate that such readings for Venus simply didn't penetrate deeply enough into the haze.) This rather cheerless picture of a dry, dusty world lasted just long enough to discourage a lot of writers (and apparently most science-fact men) from considering the planet seriously.

Recently, the readings have been improved, and now show that there is a definite trace of water vapor. There is still no oxygen, but the chief gas seems to be carbon-dioxide. This means that men still couldn't breathe

on the surface without a space suit, but it offers a lot of hope, nonetheless.

Plants can exist in such an atmosphere without trouble. In fact, they should thrive on it, since water and carbon-dioxide are the chief source of the material used to build their cells. Probably the first plants with green chlorophyll appeared on earth when our own atmosphere was made of just such a mixture of gases as we now find on Venus. Oxygen is far too active a gas to remain uncombined for any length of time. The green plants, however, broke down the carbon-dioxide and released some of the oxygen into the air. They did such a good job of this that one-fifth of our air is now oxygen, while less than one part in three thousand is carbon-dioxide. They literally gave us the air we breathe.

Hence, as MacLean suggested a dozen years ago, men can actually change the air of Venus to suit human needs before a single human being ever lands on the surface. We are already talking—perhaps a bit hopefully, but still with some certainty—of sending probes into Venus' atmosphere in the near future. Suppose, instead of sending only instruments, we include a few pounds of some kind of plant seed, such as spores?

Spore Treatment

Some of the spores are so fine that a single pound should be enough to scatter across vast areas of the planet, carried for tremendous distances by the winds. These things are rugged; in fact, they can survive long periods of being cooled to the temperature of liquid air. The trip through space shouldn't hurt them at all. (Arrhenius suggested that such spores might even be carried across space to other worlds by light pressure, though this theory is pretty well abandoned now.)

Once dropped into the air, they will settle slowly. Most will almost certainly perish, but those that live should soon cover the entire planet with a dense growth. Venus provides so much carbon-dioxide and sunlight that she should prove a perfect feasting ground for plants. As an added virtue, such plants don't even need insects to pollenate them. Most of them are pretty small; but it should be remembered that the giant fronds and stalks that made up the forests of the carboniferous age were closely related to modern spore-bearing plants. A little selective breeding should do wonders before the spores are shipped across space.

On later trips, after the first plants have paved the way and

the probes have given us more information, we can be more selective about what seeds to send. Grasses and clover—which fix nitrogen out of the air and enrich the ground—may go next. Eventually, even trees may be shipped across as seeds. To add the proper texture to the soil, we might send over earth-worm eggs, since worms are the great natural cultivators.

Thus, in a short period of time, we could provide man with an atmosphere suitable for breathing. The first human settlers wouldn't have to land on Venus until all this work was done.

Of course, science sees difficulties to all this. One of the jobs of science is to find trouble before it really turns up. To paraphrase Mark Twain, space travel has seen many troubles—most of which never happened. Usually, while one branch of science seems to be in trouble, some other branch—seemingly unrelated at times—will have the answer. It is the job of science fiction to skim around and dig up the answers from the odd places where they lie unknown.

The biggest problem with the adaptation of Venus seems to be the temperature there. According to the latest measurements made from earth, this is about 585°. That is too darned hot, even for plants. Even the

cooler polar areas of the planet wouldn't get much below the temperature of boiling water if the equator reaches such a record heat. The longer day on Venus will also aggravate the situation, since it provides a long time under full sunlight for the heat to build up.

HOW HOT IS HOT?

Fortunately, there are plants on earth that can stand some pretty high temperatures. In Yellowstone National Park, a slime-mold manages to live happily in hot springs where the temperature rises to 190°. Such plants as this might well stand the temperatures to be found around the polar areas of Venus. And with such cells as a start, biologists might be able to breed other plants which would prove viable at extremely high temperatures.

But this may not even be necessary. The figure of 585° is fairly close to what one might expect if the amount of sunlight striking the planet is compared with that striking earth. This seems to help prove the results obtained by the measuring instruments. However, a similar calculation for Mars would place the surface temperature there some 200° below what it actually is, so there must be another factor involved. And,

of course, there is. Any body which is warmed to a higher temperature will radiate far more of its heat off into space, thus cancelling out some of the effects of the increased intensity of sunlight on Venus.

Furthermore, measurements made of Venus from earth are notoriously unreliable. And for that matter, a measurement of Earth from Mars would probably yield a temperature of 170°; that happens to be the temperature found in a layer of the stratosphere, and it would probably blanket out any reflection or radiation of heat from the surface of our planet.

In all probability, the temperature of Venus at the equator must be slightly higher than that of boiling water. This is rough, but it means that the polar areas should be well within the limits plants can tolerate without trouble. Billions and billions of acres of the surface should prove to be suitable for our oxygen-releasing plants to do their work.

As the carbon-dioxide is withdrawn and oxygen replaces it, there will probably be a great increase in visibility. (This is caused by the fact that the water vapor will also tend to condense with the disappearance of the other gas, as I'll get to later.) Now, for the first time, the probes sent from earth will be able to map and survey the

planet. After that, it may be possible to land ships with men on the surface.

Almost certainly, at the beginning of man's exploration of Venus, large areas of the planet will be too hot for comfortable existence. Perhaps only at the poles will there be any chance for men to move about safely on the surface. With the aid of artificially cooled shelters, further exploration and study can be done. But this would still hardly be the kind of world to justify putting up big homestead posters on earth to attract new settlers.

If such proves to be the case, there is still much that can be done. Nobody has to accept the natural temperature as the inevitable one. (This is also true on earth, where men can probably learn to regulate the temperature to prevent another ice age or too great a rise in temperature.)

THE SUN SCREEN

One theory for the occurrence of the ice ages on earth was that volcanic eruptions threw out great clouds of dust, which cut off the light of the sun. When Krakatoa blew up in the Pacific, measurements made in Europe showed a decline in sunlight reaching the ground for several years—a decline as great as

20%. This was from only a single gigantic volcanic eruption.

There has been enough study of the matter to give us a pretty clear idea of how large the particles should be to produce air suspension for long periods of time and still screen off the sunlight, reflecting it back into space where it can't heat the planet.

Krakatoa probably threw up ten to fifteen cubic miles of such dust. That sounds like a tremendous amount of material, and it is most certainly not going to be ferried across space and spread from above. But there's no reason why it can't be created on the planet itself.

Volcanoes can be located and triggered by hydrogen bombs. This is not an easy project, but it seems to be within the limits of possibility. Remember that the working crews will have air to breathe and plants grown right on the planet. Probably even suitable sites for ores for construction can be located. It will be a lot simpler than trying to get anything done on the moon or on Mars.

The bombs would have to be sunk in deep shafts. But this has some advantages. Most of the radioactive material produced by the explosion would be trapped far underground, where it would be harmless. The bomb isn't intended to lift the huge

mass of material into the air, but simply to add a little extra push to the natural forces already there to be used. And we can be pretty sure that there must be some volcanic activity waiting there for us. Even such a dead world as the moon has recently revealed such unquestionable signs of volcanic activity that the original Russian announcement has been confirmed by astronomers all over the world.

It might even be possible to make such dust and send it up for scattering. (Perhaps such dust would be made of something like fused rock in which bubbles of hydrogen would be trapped, to lighten the particles until they might even rise by themselves. This is a normal enough advance in technology.) This would be a tremendous job, but it would be a cheap price to pay for a whole new world.

The decrease of 20% observed in the amount of sunlight reaching the surface after Krakatoa would release immense amounts of land for use within the zone of comfort. With this reduction in the total energy reaching through the atmosphere, the tropics would be hotter than earth, but not so hot that men couldn't travel across them, while the rest of the planet would be within satisfactory limits. But of course, the dust

could be made even thicker in the air, to shield off more light. Practically any temperature wanted could be contrived, even to a fair imitation of the climate of earth.

HOTHOUSE IN THE SKY

However, the release of such dust into the air might prove to be unnecessary. Possibly our old friends, the green plants, will do the whole job for us, including the lowering of the temperature to a point satisfactory for intense settling of the planet. This is a more desirable method.

The idea here goes back to the same speculation on the ice ages which provided the dust-shield plan. Svante Arrhenius was responsible for this, just as he was for the study of spores in space. He turned the problem inside out by assuming that earth's normal temperature was that of the ice ages. In that case, what produced the periods of warmth, such as those of the age of dinosaurs and the current ending of the last age of glaciation so close behind us?

The solution he found lay in our old friend, the carbon-dioxide gas in the air. This has the characteristic of being transparent to the rays of ordinary light, such as the sunlight that strikes the earth. But it is opaque to the longer heat radiation which

is radiated from the ground back into space.

In this way, it behaves like a piece of wood, which will let short X-rays through easily, but which will block out the passage of the longer visible light. Most substances are more opaque to some radiation than to other wave lengths.

Arrhenius called this action of carbon-dioxide in the air a "hothouse" effect, since it acts exactly like the glass in a hothouse. Glass also lets light through, but reflects the heat radiation. In such a hothouse, the heat is trapped inside, while more light streams in to heat the ground further, thus permitting a temperature rise far above what would occur without the glass.

In the case of the carbon-dioxide, the effect is quite remarkable. There is only about .03% (three parts in ten thousand) of the gas in the air, but this tiny fraction is enough to increase the temperature by more than thirty degrees over what we would find without it. That's quite a change in climate.

Now remember that Venus currently has a carbon-dioxide percentage in the atmosphere which is hundreds of times as great as that on Earth. Obviously, the term "Hothouse Planet" applied to our sister world by many science fiction writers in

the past must be a literal description of the situation. Light streams down from the sun, only 67 million miles away. It passes through the clouds and air of Venus and hits the surface, where it is converted into heat. Then a major portion of the heat radiation bouncing back toward space is reflected by the gas and kept from leaving.

The removal of most of this gas from the air of Venus would produce a lowering of the temperature that would be tremendous, though it is difficult to say exactly how great it would be. All we can say is that the removal of carbon-dioxide would change the weather forecasts to "cold and colder." As the temperature fell, the planets could move further and further towards the equator, thus speeding up the process of removing more gas from the air and exchanging it for oxygen.

There's a secondary effect of this which must not be overlooked. Carbon-dioxide isn't the only gas which acts in this hothouse-effect. Water vapor behaves in the same manner, though with somewhat lower efficiency.

FINDING A BALANCE

Since we know that the latest readings from reflections off the atmosphere of Venus indicate

both carbon-dioxide and water vapor, we now have the worst possible combination.

The plants won't directly remove this water vapor, of course. The carbon removed is partly lost forever as the plants die and clump into peat bogs, beginning to turn into coal. The water is released, however. But indirectly, the plants will also change the amount of water vapor to be found in the air.

The amount of water in vaporous form which can be held by the atmosphere is related to the temperature. The higher the temperature, the more water vapor. This can be seen easily in a basement on any summer day. A cold pipe will begin to sweat; this simply means that the warm air laden with vapor is cooled on contact with the pipe and some of the vapor has to condense out as water. The same fact accounts for the ice that collects on refrigerator coils and explains the action of the popular electric dehumidifiers.

As the carbon-dioxide content comes down, the temperature is lowered. Then the air becomes supersaturated with the water-vapor, since it has more than it can hold. The water vapor has to condense and fall as rain. This, of course, lowers the temperature still further by decreasing the hothouse effect! And around

and around she goes, until a balance point is reached.

This balance is established finally only when the percentage of carbon-dioxide in the air is so low that plants have a harder time getting enough of it to use in their growth. As they grow more slowly, either from reduced temperature or shortage of carbon-dioxide, they take less out of the air. On Earth, the balance is struck for our average temperature when the gas reaches a level of .03%, as mentioned before.

On Venus, the level for balance will probably be much lower. Since the planet receives more sunlight, a comfortable temperature could be reached only when both the level of water vapor and that of carbon-dioxide are far lower than on Earth. Also, because of the greater amount of sunlight, the plants might operate more energetically to capture the smaller percentage of the gas they need. Perhaps the level might fall to .01%. This would have some slight effect on the breathing of men, since our breathing is regulated by the percentage of carbon-dioxide in our lungs; but the effect would be slight, because most of the gas in our lungs is released from our blood rather than being dependent on the level in the air. So the difference between the new atmosphere of Venus and that of

Earth should present no real difficulties for us.

FAIR AND COOLER?

There is another effect which would somewhat counteract the removal of the carbon-dioxide. This would come from the thinning of the cloud mantle over Venus. At present, this is so complete, so high and so dense that nobody has positively seen any surface feature of the planet.

With the condensing of the water from the air, the cloud layer would become much more tenuous. This would change the power of the atmosphere to reflect away the light from the sun. At present, the cloud layer gleams with pure white in sunlight because of this high reflecting power. Once the clouds thin, more light must reach the surface.

Because of the complexities of the various factors and their reactions on each other, it is difficult to estimate just what change in temperature could be expected from the introduction of the plants to Venus. Even such things as the possibility of ice caps forming and reflecting light back toward space must be considered. But the total effect would be considerable.

It is possible that the change in the atmosphere alone would

be enough to make much of Venus suitable for men to colonize, though the tropics would still probably be much too hot. Since Venus lies 25 million miles closer to the Sun than Earth, we can expect that even a somewhat different balance of water vapor and carbon-dioxide will not be quite enough to give us the same temperature and climate on both planets.

If the change is great enough—as it probably would be—to permit any sizable portion of the planet to be homesteaded, there would be no need for haste about further improvement. The problem would be one of ships to carry the men and equipment to begin the settling of the planet and release some of Earth's overpopulation pressure.

When the population did begin to swell beyond the convenient limits of the comfort zones, further work could be done. There is no reason why the idea of the dust shield could not be added to the changes produced by the plants. There would now be far less expense involved, since a population capable of manufacturing its own machines on Venus would be in existence, and no supplies would have to be ferried from Earth. With such a combination of ideas to draw upon, we should be able to "terraform" Venus almost completely.

(cont. on page 130)



"Scrup sclopf munkl to you, too!"

THE NURSERY COMMANDOS

By ADAM CHASE

Normal, healthy-minded kids live in a dream world. And this world is pretty elastic. It can be populated by Hop-along Cassidy in the morning and Buck Rogers in the afternoon. A six-gun can turn into a ray-gun between bites on a candy bar. A rather unstable existence, you say? Perhaps, but these kids may be our last and best weapon.

IS THAT you, Eli?" Eli Wallace's mother called when he had gone halfway up the stairs.

"Yes, Ma," Eli said reluctantly, one foot poised to continue climbing.

"Come down here, Eli. Your father and I want to talk to you."

Feet dragging, Eli went downstairs. He had reddish blond hair and freckles, but you couldn't see the freckles for the greasy smudges on his face. His shorts and polo

shirt were begrimed and torn. He looked as if he had just come through a battle-zone, miraculously unscathed.

Mr. and Mrs. Wallace were finishing their supper. Mr. Wallace was smoking a cigarette and studying the outline of a T-bone on his plate. Mrs. Wallace said:

"You realize, Eli, this is the fourth night in a row you were late for supper. We didn't wait."

"Aw," Eli said.

"Eli, don't you know when

you're supposed to come home?"

Being eight years old, Eli had an eight-year-old's appetite, but he said, "I guess I forgot. I guess I just wasn't hungry." But his mouth began to water as he looked at the empty plates.

"Do you realize that you worried your father and me? What have you been doing?"

"Just the gang," Eli Wallace said. "There was a stagecoach come down Spring Street with a hun'ed dollars in gold bull-yon and everything. We shot the driver and the guard and took the bull-yon. I woulda been earlier, Ma, only the stagecoach was late."

"Stagecoach!" Mrs. Wallace said in exasperation. Mr. Wallace hid a grin behind his hand.

"Well, honest, Ma. The whole gang was there." Eli patted the six-shooter hanging at his side. "I shot the guard," he said proudly. "Got him right in the head!"

"You can play any game you want, I guess, Eli Wallace," Mrs. Wallace said, grinning a little too. "But in the future you remember your suppertime and see that you come home when you're supposed to. Promise?"

Eli nodded earnestly, then

said: "If the sheriff comes, I'm not home. Promise?"

Mr. Wallace turned away, laughing and trying to hide his laughter. Mrs. Wallace said: "Well, all right. A promise for a promise. And no supper for you tonight, young man."

Eli trudged out of the dining room and upstairs.

"I really think Eli shouldn't watch so much TV," Mrs. Wallace said. "That's where they get those ideas, Sam. From TV. Don't you see, Eli and that whole gang of his really believe the games they play. They're just too real. Sam, if Eli doesn't start to grasp pretty firmly the difference between fact and fantasy, I want you to ask Dr. Stanley what we ought to do."

"Now wait a minute, Martha," Mr. Wallace said. "If this thing's getting out of hand anywhere, it's in your own mind. They're only making believe. Sure, they try to make their games as realistic as possible. Maybe in the heat of the moment they actually think they're holding up a stagecoach. It's perfectly natural. They know they aren't. not really."

"It's just that Eli's so—well, earnest about it."

"So are the others. I've seen them at play."

"Well, Sam—I don't know. I just don't know. I wish you'd have a talk with the boy, though."

Mr. Wallace mumbled an answer which left the issue hanging in air, and went into the living room for his newspaper.

Upstairs in his room, Eli was stretched out on the bed, resting. He'd need all the rest he could get. They were going out to a secret meeting tonight. Eli's breath came faster when he thought about it. Midnight. A midnight meeting. He'd never been out at midnight before. There was going to be a full moon tonight, though, so he'd have no trouble finding his way. Eli smiled happily. Cowboys in the afternoon, that was all right—but spacemen at night, now that was really something!

He went to his closet and got out his Captain Space helmet and polished the plastic sphere with the edge of his bedspread. He found his raygun on the shelf near the window and stroked the bronze hand-grip. When you pulled the trigger it went *brrr-aaaa-tttt*, and sparks flew. Boy, it was almost real. Almost, he thought. Only to

yourself did you say almost. The guys never said almost to each other, so you shouldn't ought to say almost to your folks, either. When you were playing, it was real all right. It was as real as real could be, as real as you used to think dreams were, until a year or so ago when you really started to grow up. But at home and alone you could say almost because you knew, truly, that you were only making believe.

Thinking happily of what the night would bring, Eli drifted off to sleep.

He awoke with a start and immediately looked at his Buck Rogers wristwatch. He whistled softly. It was ten to twelve. The house was absolutely silent, and dark. There was white light streaming in through the window, though. Bright moonlight. Eli could see the time on his wristwatch by the light of the moon, it was that bright. He stood up quietly and took off his cowboy boots, replacing them with the spaceboots which had been his eighth birthday present. There was a smiling picture of Captain Space, the Man of the Future, on each boot. Then Eli removed his gunbelt and substituted the raygun. Last of

all, he put the space helmet over his head. Then he went to the window. It was a warm night, and very still. Eli unhooked the screen and climbed out into the white moonlight. He found the porchroof with his spacebootshod feet, and crawled quickly across it, then let himself down to the ground on the rose trellis.

White moonlight, a warm breeze, and silent, deserted streets. Eli walked quickly toward the corner, and turned up Spring Street. This was really living. . . .

It was a very typical planet circling a very typical star, Bjaz thought as he brought the spacescout down, but it was within the necessary distance range of its primary and had the proper albedo to indicate a strong possibility of life. Since life meant conquest—provided the prize was worth the job and the dominant animal strain on the planet, if any, would not offer resistance out of proportion to the only modest storehouse of mineral resources that the planet would be—Bjaz swooped down from the mother ship in his spaceship, prepared to find out.

The key to conquest, of course, was attitude. If the

natives of this planet were prepared to resist with all their might and if their civilization had advanced as far as gunpowder or atomics, then it wouldn't be worth the casualties and logistics problems of conquest. If, on the other hand, the natives were docile, unimaginative, bovine-like creatures . . . Bjaz stroked his antennae together in anticipation. He thought: Twenty-eight. That was a good round number. This was his twenty-eighth and last world. He would retire and live well on one of the conquered worlds the rest of his life. Of course, if this particular world proved too tough a nut to crack, Bjaz would go on, seeking elsewhere. It was all up to the inhabitants, and how much they were willing to fight for their freedom. Then, too, this was a backwater of the galaxy. No scoutship had ever been here, and perhaps there already was a complex of local spatial cultures fighting for power. Bjaz would avoid their fight like the plague. . . .

"Hey, Eli! Over here!"

It was the vacant lot back of the Sutter house on Spring Street. The space helmets bobbed in the tall grass and weeds, their plastic surfaces

agleam in the moonlight. Eli took out his raygun and fired it. "Brrrr-aaaa-tttt!"

Tommy Webb knocked the gun aside. "We ain't chosen sides, stupid," he pointed out. Eli flushed. Tommy Webb was nine and a half, almost ten. Tommy was an expert on space stuff, having visited the planetarium in New York City once. Besides, by virtue of being biggest, oldest, and most of all strongest, Tommy was the leader of the gang.

A cricket chirped in the weed-grown lot, and another answered it. The whole idea of being out at night like this with the night sounds and the night smells fascinated Eli. He wished this night would go on forever and ever.

"Mack and me'll choose sides," Tommy Webb told the ten assembled boys. "Here's the setup. There's a rocket-ship with a valuable cargo of space-ore coming in from the asteroids, see, and we'll be waiting for it near the orbit of the moon. They won't have a chance."

"What kind of ore?" Eli asked.

"Just space-ore, stupid," Tommy Webb said.

"Who's stupid?" Eli said.

"You're stupid if you keep asking questions," Tommy Webb said.

"I'm stupid, huh?" Eli said. "Brrrr-aaa-ttt!" went his raygun. Sparks flew in the night. "I shot you, you're dead!"

Tommy Webb hit him in the shoulder, a look of disgust on his face. Eli stopped firing the raygun. He never could get along with Tommy Webb. Tommy was a bully. Besides, it was mutual. Eli's was the snazziest raygun in the whole gang, and he fired it every chance he got because he knew it made Tommy Webb, whose raygun was only a piece of wood shaped like a raygun, jealous.

They chose sides. Eli and Tommy Webb were on opposite sides, as they always were. "Now, you guys must be the spaceship coming in with space-ore from the asteroids," Tommy Webb began, "and we'll be the space pirates."

"Oh, no you won't!" Eli cried. "This time we're gonna be the pirates. Right, guys?"

There was general agreement on Eli's side. Tommy Webb shook his head stubbornly. Mack, who was almost as old as Tommy, and who was glad to have Eli with his special raygun on his side, poked Tommy one in the chest. "Brrrr-aaa-tttt!" went Eli's raygun.

A window in the apartment house across the street was flung open and a man's angry voice shouted. "Hey, you kids, gowan get lost before I calla cops!"

"Look what you done now, stupid!" Tommy Webb hissed at Eli, who had hastily stopped firing his raygun. "Now we'll have to find someplace else."

"All right," said Eli. "But we're gonna be the pirates, see? Or else I'll fire my raygun again and—"

"O.K., O.K.," groaned Tommy Webb, "only keep that thing quiet until we're ready to play."

"You swear we can be the pirates this time?"

"I'm not gonna swear nothing!" Tommy Webb said, suddenly sullen.

"Brrr-aaa-tttt!" went Eli's raygun.

Tommy hit him and tried to take the raygun away. Eli ran across the lot, laughing. The man in the apartment house yelled again.

"... warned you kids ... gonna calla cops is what ..."

Just then a big bulky shape came floating down soft as a feather in the moonlight. It was bulky like a fat teardrop is bulky. It landed on its side in the lot with hardly a sound.

"Will ya lookit that!" said Tommy Webb.

"A spaceship!" somebody yelled.

Eli grinned in anticipation. Sometimes they had their little arguments, but once the game got underway, the arguments were quickly forgotten. Man, but the spaceship seemed real! Even realer than the imaginary stagecoach had been this afternoon! Of course, it *was* make-believe. It had to be make-believe. Sometimes you could get all wrapped up in your games, that was all. But it sure looked just like a spaceship ought to look. All you had to do was believe things were real and just what you said while you were playing. That way you sure had the most fun. Suspension of disbelief, an adult would have called it, but the term would have meant nothing to Eli. And in this case, no suspension of disbelief was necessary, although Eli couldn't know that. The spaceship was quite—dangerously—real...

"Come on, gang!" Eli cried, rushing toward the spaceship before Tommy Webb could react to its sudden appearance. "We must be the pirates and it's landing on Luna—" he was very proud of using the word Luna

so naturally, just like he might have said Spring Street—"to refuel. Let's get it, boys!"

And they all rushed toward the spaceship just as a door came into being in its side and slid open.

Bjaz came forth.

There was bright moonlight, lush vegetation, and a band of howling natives, rushing at him. Bjaz smiled expectantly, waiting. He was wearing a forcefield and consequently was in absolutely no danger. He could have pressed a button on the sleeve of his forelimb tunic and killed the attacking figures instantly with a meson-grid beam. But it wasn't necessary. He was only a scout, here to see . . .

His appearance brought the mob of natives up short. They milled about uncertainly while, impassive, curious, he watched them, waiting, studying . . .

"Holy Mackerel!" Mac cried. "Lookit that, willya?"

They all seemed uncertain, and a little scared. It sure was the funniest looking and biggest bug Eli had ever seen. It was a bug every bit as big as Tommy Webb, and it wore clothes. Came right out of the spaceship, too.

Yeah, sure, Eli told himself. He'd heard his mother and father talking after he'd gone to his room when he missed supper. Maybe his imagination really was working overtime. Maybe he'd have to watch it. Whoever heard of bugs in spaceships?

He didn't know the word, but he thought he could exorcise the peculiar-looking monster with boldness. "Let's get him, gang!" he cried, and charged across the lot.

He drew his raygun, firing from the hip. "Brrr-aaa-tttt!"

They were bold, all right, Bjaz thought in disappointment. Bold—or foolhardy. It didn't matter. Either way the resistance would be stiff, bloody, costly. The lead creature drew a weapon now and fired it, heedless of the muzzles of Bjaz's own blast-beams protruding from the side of the ship. One touch of Bjaz's fingers could have sent this whole mob of natives, and half their city, a mile into the air. . . .

The weapon made a loud, grating noise. Sparks flew from its muzzle as Bjaz's forcefield completely absorbed and rendered harmless whatever ray it sent forth. Bjaz guessed it to be primi-

tive atomics. It certainly was a crude weapon, though. Much of the energy was wasted at the muzzle in the form of simple sparks. . . .

"You're dead!" screamed the attacking figure. "Dead, dead, dead!" He came on implacably as Bjaz' telethinker translated the words. Telepathic suggestion? Bjaz wondered. He did not know, he had no way of telling. He was quite immune to telepathic suggestion, although the common warriors of his world, unlike the scouts, were not. He shook his head sadly.

Bravery, he thought.

Atomic weapons.

Telepathic weapons.

We could take them, of course. But they'd be tough.

Not worth it. . . .

He withdrew slowly, sadly, toward the spaceship as a new sound, a whining whistle, came out of the distance.

"Cops!" hollered Tommy Webb. "You and that raygun, Eli!"

The siren wailed closer, a car door slammed, feet pounded across the lot.

"Hey, you in there!" a man's voice shouted.

The spaceship door slid shut. The big bug had gone back inside. The spaceship purred, almost like an ani-

mal, and rose slowly from the ground.

"What the hell is that?" shouted the man's voice. It was a policeman. Two of them came running.

"Aw, just a spaceship," said Eli.

"Kids, they're just kids," the second cop said.

"That wasn't no kids flying that thing," the first cop said. They looked up at the sky.

Against the brightness of the moon, a teardrop-shape hung, then faded swiftly into the night.

"Whatever it was, it was real," the first policeman said.

"Sure, it was real," Eli told him. "That's what I keep trying to tell Ma."

"You boys better go home now," the second policeman said. "Next time we'll have to take your names and bring you all down the stationhouse for your folks to come and pick up."

"I seen it," the first policeman said.

"Maybe," said the second. "I'm not sure I saw anything. Anyhow, where'd it go?"

His companion pointed straight up. "Think we ought to notify the air force?"

"Oh, yeah, sure! That's all we'd need. Give 'em an unidentified object report like

this and you'll never make sergeant, O'Shaugnessey."

"Yeah, but—"

Eli trudged home slowly with the other guys. It had been some game. But the closer Eli got to home, the less sure he was that it hadn't really happened. Well, he wouldn't tell the folks, anyhow. They'd razz him sure, if not worse. Besides, whatever that big bug was, the gang had sure scared heck out of it. Eli slipped through his window after mounting the trellis and the porch roof. Soon he was sound asleep.

Back at the vacant lot, O'Shaugnessey couldn't make up his mind. He'd seen the thing, all right. But—report it—? U.F.O. — Unidentified Flying Object. The police funnelled a dozen calls like that a week to the local Air Force base. The Air Force was very patient and the po-

lice, very cynical. O'Shaugnessey couldn't send in such a report—with himself as viewer. He just couldn't . . .

But when he looked at the very center of the vacant lot, the ground seemed to be glowing.

With radioactivity. . . .

From a spaceship?

Well, whatever it was, it was gone. Somehow, the kids had chased it. Anyhow, they hadn't seemed scared, had they?

O'Shaugnessey joined his partner in the prowler car and did the only thing he could do under the circumstances. He waited until he was off duty and then belted the bottle he kept for just such emergencies—long and hard. By the time he was finished he had convinced himself that it had been some kind of optical illusion.

Anyhow, it didn't matter now—thanks to Eli.

THE END

(cont. from page 35)

matter. He said it knowing he was sounding the one truth that was inescapable. The one truth that Wummel had died because he had been deprived of a home.

"There is no home, if there is no rest. There is no rest if there is no *Home*."

Then he turned back to the viewport. The First Mate moved to leave, but the soft

words of the Captain, spoken against the deadened surface, stopped all movement. Staring at the empty surface, he murmured.

"It died, and the last thing it felt . . ." he paused.

"It pitied us, Charlie. That's all. It didn't hate us for killing it.

"It just pitied us."

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THE END

Worlds at WAR

A Classic Reprint

BY ED EARL REPP



IT was early night on this world called Earth. So the Korjans had told Saran, who was an Earthman, yet was seeing Earth for the first time in his twenty-five years of life.

"I owe my life and my allegiance to Ryg and his subjects," said Saran. "I have only hatred for the savages of the Earth. For when I was very young, they set my father and me adrift in a space ship, to die of hunger or madness. A Korjan vessel rescued me after my father's death. From that time on I have loved the worlds of Korjan and now I will repay them and show my gratitude."

The space ship had landed here on a rough slope among low hills. Over them came the light of a moon that was as white as Saran's hair was gold, and the earth glinted like the dark bronze of his skin. Tall and steel-muscled, he stood on one side of the thick glass wall that separated him from the Korjans. All

his life had been a preparation for this moment.

"Thank you, Saran." The words smashed at Saran's brain like the clang of metal. Ryg, High Leader of all the frozen planets of the Dark Star was communicating his thoughts. He seemed to Saran to be no more than a diaphanous, almost formless wraith that shimmered, lacy and spidery, beyond the glass partition that bisected the room of the space ship.

"You know you are our chosen one, Saran. Without you we cannot conquer. This earthly pressure of atmosphere would kill us quickly. Yours is the final phase. The energy-stations which we hid here on Earth must not be discovered. They must keep on killing the young at birth."

Saran listened. So many times he had heard the ritual of this talk. Now, as he listened, he stared out at the world called Earth, a strange world of trees and fields, oddly lovely in the moonlight, twisting his

INSTINCTIVELY Saran knew it was wrong to carry out his awful mission against the men of Earth, but he dared not fail—because somewhere, unseen, *The Other* was watching!



heart with vague memories. It was incredibly different from the Korjan worlds of ice and atone.

"I will find this scientist known as Moss Hartley," said Saran, when Ryg's thoughts ended. "I will stop his dangerous meddling. The plan is an excellent one and will not fail."

For this he had voyaged millions of miles through the void. For vengeance, for gratitude. The white roon rose higher over the hills in the distance.

"I know you will not fail," came the response. "You will be watched constantly by—*The Other*."

Saran started. "The Other?" He frowned. "Who is The Other?"

He felt the amusement among the Korjans beyond the wall. It was a sly, soundless laughter accompanied by the rolling of gruesome eyes and a vibration of tentacles like sea-growths stirred by vagrant currents.

"The Other, Saran," Ryg informed him, "is another Earthling who came to us just before you. He has been on Earth for months, spying for us. Yet he lacks your strength and intelligence, which we need now. But should you ever feel the urge to betray us, he has the means of destroying you promptly."

Anger stained Saran's flat cheeks. "You mean I'm to be spied upon like—a common Earthman?" he gave back, his muscles stiffening.

"Simply because you are an Earthling, Saran," returned the Leader. "We trust you and love you like our own. But to remove temptation from your path, lest you slip into Earthly ways again, The Other will be always near you. Do not try to learn his identity; it will be the one you least suspect."

Saran was still under the grip of resentment and wonder when Ryg addressed him once again, this time with stabbing force.

"What is your supreme duty, Saran?" he demanded.

This key-question immediately plunged the Earthman agent back into his well-learned rôle.

"My duty is to Korja, the Dark Star," he said firmly. "And to the flawless civilization it represents. I owe allegiance to Ryg only until death." He stood straight and tall as he parroted these words. "I will consider my mission finished only when I have succeeded in destroying Hartley and all other interference to our plans. I am ready, Leader."

"Theo go!" Ryg commanded, and with a filmy tendril he gestured toward the door. "Do not fail, Saran. It is the command of Ryg and the Supreme Command of Korja. Go now!"

Saran bowed, and turned swiftly to unlock the air-tight port. Without another word, he left the space ship and reclosed the door. He had barely moved to a safe distance when, with a hissing wall, the small ship arched into the air. Blazing rocket-flares merged into pinpoints, dissolved in the black sea of night. Then Saran was alone—horribly alone.

HE felt a momentary terror. In all this vast world spreading out around him, he knew no living soul. His very life depended on his cleverness in the next

few days. Yet in many ways his position resembled that on the planets of the dead star.

He had known no one of his kind there. Of his early life, before he was rescued by Ryg, he remembered nothing. But sometimes recollections kindled in his mind. Memories of a tall, kindly man striding through a lofty laboratory. Dreams of himself tagging at the man's heels, asking countless questions. Then of a flight through space—and after that, nothing—

Saran's fright blended naturally into anger. Ryg seemed not to care what risks he took, so long as Korja prospered by them. Ryg's sole interest in him, he felt, was to secure a new world on which the people of the Dark Star could live. For the five planets were becoming too cold to support life.

Earth was the logical home for them, but first it must be altered, the oxygen-laden atmosphere removed, so that the Korjans' lacy bodies would not be crushed like a glass globe at the bottom of the sea. Before that could be done, mankind had to be put out of the way. Until Moss Hartley entered the scene, it appeared that life would disappear from Earth very smoothly in the course of sixty or seventy years. Now, drastic measures were called for.

Yet Saran was loyal. His life had been a preparation for this task, but he owed that life to the Korjans. He had to repay them. Ahead a highway loomed and Saran took it.

New feelings tingled through him. A boundless sense of freedom claimed him at his ability to stride along unhampered by a bulky pressure-suit such as he'd had to wear on the planets Ryg ruled. His steps were long and springy. Here, there was slightly less gravity to bear down upon him.

Saran found himself looking forward eagerly to meeting other men of his kind. And women—he could scarcely remember what the word meant. Yet nature had implanted seeds of possessiveness and longing within him; these feelings puzzled and intrigued him, and now he felt on the eve of solving his inner restlessness.

Saran reached the road and swung along it rapidly. He covered the miles without fatigue. New, fresh blood seemed generating in him like sparkling wine. The warmth of the air, its cleanness, had their way with him. Saran felt as though he were really living!

He had gone about ten miles when a strange, frightening thing approached him from the rear. It slid along the road like half the shell of a shiny black wal-out, light spreading a yellow fan on the macadam before it. Saran's heart pounded as he dodged out of the way. With a roar, the machine was upon him, grinding to a halt with a slithering of rubber.

A door popped open. A man's voice called:

"Hop in, buddy. Going as far as Los Angeles?"

SARAN was gripped by confusion. Inside the car was a form and face similar to his own, yet vastly

different. He stared at the man. Then a delighted grin broke on his features, which the pudgy, stout man returned in kind.

"Thanks!" Saran replied. "Just where I'm going."

He sat down on a deep, soft affair of sponge rubber and the machine surged forward once more. Saran, relaxing, studied the driver out of the corner of his eye.

He felt oddly at ease with him—much more so than when he had sat beside Ryg in the Hall of Science. Sometimes the driver laughed at things he said, as if they were meant to be dryly humorous. But Saran was merely experiencing difficulty in understanding. Once the car owner, groping for a cigarette, muttered:

"Take the wheel a minute, will you?"

Saran tried to. The car swerved viciously as he tugged at the wheel, trying literally to tear it loose. The man thought it was an attempt to be funny, but didn't laugh quite so hard this time. The driver turned to him again.

"Where 'bouts, buddy?"

"I don't know, exactly," Saran admitted. "I'm looking for Moss Hartley—"

"Moss Hartley! Well, it won't do no harm to look for him. But you'll darn well go away disappointed if you expect to talk to him. He's been in conference with them four foreign scientists for a week, they tell me, trying to dope out something on the plague. You'd have no more chance of seeing him than if you was selling brushes. Especially in that outfit."

Saran's glance followed the other's to his clothing.

"What—what's wrong with them?"

The driver looked apologetic. "Sorry, buddy," he murmured. "Nothing, except that they haven't been sporting woolen pants and leather shoes for years. I thought you was going to a masquerade."

Saran crimsoned. How many more details like this had they overlooked? he wondered.

"I guess I do look odd," he faltered. "You don't know where I can find him, then?"

"Sure. At his home in Beverly Hills. If you're going there, better get off at the next corner and take the Santa Monica car."

Saran nodded eagerly. He felt as if he were on the verge of being completely exposed as a saboteur. As the car slowed, he pushed the door open, thanked the man, and hurriedly walked off.

For some time he stood in a shadow-filled doorway, pondering his next move. At this moment he thanked his stars for the little store of books that had been found in his father's space ship. From them he'd learned what little he knew of Earthly civilization. But those books couldn't explain how he was to get in to see Moss Hartley.

Well, he could do worse than proceed to his home and try, he decided. But if he failed—nothing to do but wait a month until Ryg returned and gave him further orders.

On the street car, Saran created an amusing situation by pretending—as the passengers thought—not to

know what coin to give the conductor. He had been told a dime was the fare to Beverly Hills, and proceeded to study the coins he had in his pocket until he found one labeled, "One Dime."

The conductor accepted it and disgustedly jerked a thumb at the interior of the car.

"Take your seat—drunk!" he snapped.

Red in the face and still more befuddled, Saran found a seat and hastily slumped down.

CHAPTER II

World of Living Dead

THE Hartley place was a mansion atop a wooded knoll, set well back from the crowded thoroughfares. Saran found no trouble in gaining the front door—but there his worries commenced.

A grave, unrelenting visage showed in the crack of the door following his knock. As the man did not speak, only stared impatiently at the swart visitor, Saran broke the silence.

"I'd like to see Dr. Moss Hartley," he stated.

Something like a laugh issued from the butler's lips.

"So would ten thousand other would-be scientists," he remarked. "Good night to you, sir."

"But you don't understand!" Saran's foot protruded to prevent the door from closing. "I know what is causing the plague. I can stop it. Dr. Hartley will want to see me!"

"All right, boys." The butler opened the door and a pair of brawny figures sauntered out.

They took Saran by each arm and spun him about. One of them snarled:

"All right—crackpot! Try to bust in here like a process server, will you? Take this back to the rest of the screwballs!"

His fist slammed into the back of the visitor's head. At the same instant, the second guard aimed a kick at his back. But in the instant before the blow landed, Saran himself came about with a guttural curse.

Savagely he fastened long fingers about each throat. With a grunt, he brought the men's heads together. One of them sagged to the lawn as his knees buckled. The other dodged aside, to rush back with swinging fists.

Saran appeared not to move, but his body wove gracefully from the path of the flying fists. The bullet-headed man came up against him in surprise. Then Saran gently raised his fist up beneath the guard's chin. Teeth clattered like castanets; the man writhed down.

When Saran started for the door again, it slammed in his face and a lock clicked. Saran could only stare. After a moment, he moved away, deeply troubled. He did not doubt that he could break the portal down, but that would only earn him more trouble. Somehow, he must get inside, in such a way that Moss Hartley would listen to him. And, listening to him, would doom the world—

A vibrant, silvery voice brought him spinning about. Within a few feet of him was the loveliest creature Saran had ever seen. It was a girl. A strange sight, indeed, to his eyes, but one that made his pulses quicken.

Brown, wavy hair framed a pale oval of a face. Laughing red lips mocked the baffled man. A full-curving body was revealed by tight-fitting gold-cloth blouse and skirt.

"Congratulations!" she was saying. "Out of forty-odd hare-brained scientists those two plainclothes men have tackled, you're the first one to lick them. Not that I mean you're a hare-brained scientist—forgive the implication."

"I—I'm sorry about what I had to do. But they attacked me, you see." Saran regarded the still forms ruefully.

"Sure," the girl said. Then: "Well, what's your plan to save the world?"

Saran read deep bitterness in her words. But he shook his head.

"I came here to see Moss Hartley. What I've got to say is for him alone."

The delicately arched eyebrows raised a trifle.

"I'm Helen Wade, Dr. Hartley's secretary," the answer came quietly. "Perhaps—since you do seem more sensible than the others—I could get you a very brief audience with him."

"If you could!" Impulsively, Saran took her forearm in his powerful grip. She winced, then laughed.

"If it means that much to you—come!" she invited, and led the way around the corner of the house to the rear.

HER private key let them in a back entrance. They passed through several dark, deserted laboratories. Ascending a flight of stairs, Saran asked cautiously:

"These other men with him—who are they?"

"Don't you read the papers?" the answer mocked him. "They are the four leading scientists of the world. Ferguson, of England; Ferrin, of France; Rutters, of Germany; and Massetti, of Italy. Any one of them has a reputation greater than that of Doctor Hartley. But his discovery has aroused attention all over this god-forsaken world of ours. They were sent here to study his methods by their respective governments."

Then they were stopping before an unobtrusive-looking door.

"Brace yourself, Mister!" the girl smiled. "You're either coming out of here a hero or a failure."

Her polite rap brought a gruff voice through the panel.

"Who is it?"

"Miss Wade, Doctor. I have an important visitor to see you. May we come in?"

Footfalls thumping across a carpet. The door pulled open. For a moment light blinded Saran, so that all he could make out was swirling wreaths of tobacco

smoke and dim shapes around a table. His vision clearing, he let his glance go over the tall, rawboned figure at the door. The man's hair was disheveled, his coat off, a reeking pipe between his teeth.

"Important, eh?" the doctor snapped. "Who the devil is he?"

Saran put in hurriedly: "John Saran, Doctor. I have a—a plan you might—"

"My God, Miss Wade!" Hartley yanked the pipe from his teeth. "You interrupt us to bring in another would-be savior? This is going to cost you your job!"

"But, Doctor Hartley! He's explained his idea to me. I think it will hold water," Miss Wade lied beautifully, smiling engagingly as she spoke. "Won't you give him five minutes?"

"Oh—come on in!" Hartley growled disgustedly. Slamming the door after the pair had entered, he pointed a crooked forefinger at the five men gathered about a paper-littered table.

"Ferguson, Ferrin, Massetti, Rutters," he tolled off. "More brains than you've ever seen around one table in your life. And my assistant, Smedley, not so backward himself. Speak slowly and as clearly as you can. Some of the gentlemen don't understand our language very well."

Saran was studying the men closely. Oddly, in this moment he was recalling Ryg's words regarding The Other:

"It will be the one you suspect least!" And it came to Saran that here among the men in the room was the Korjan spy. His eyes swept over them.

Rutters, the German, was solid, straight-backed, bald, with a wide mouth and blue eyes under blond brows. Those eyes went through the young man like a bullet.

Ferrin, of France, a tall man, lolled in his chair and smiled at Saran as if to put him at his ease. There was an ashtray heaped with smouldering cigarettes at his elbow.

Ferguson was blond and gaunt and stern. His nose, long and looming, seemed to bisect his overlong face. Massetti, the Italian scientist, was his counterpart. Short, fat, and possessed of snapping black eyes, oily hair in a mass of unruly curls, and an impersonal smile.

Saran's gaze finally came to rest on Smedley, the assistant. Instant dislike swept him. The man had pale eyes like chips of ice, and flaccid, unhealthy skin stretched over his bony face. That skin was the one thing that allayed Saran's suspicion. It would be improbable that any man could make the long voyage through space without becoming as deeply burned by intense solar rays as he himself. At last Saran began to speak—to speak the things Ryg had schooled him in so long.

"Gentlemen, there is a reason for what has overtaken Earth!" The force of his statement arrested their bored inattention at once. "Nature is tired of man. She has tired of him as she tired of the dinosaur, after putting three hundred million years of careful development on that misfitted beast. Even as she

tired of the dinosaur's successor after another twenty million years.

"Today nature is tired of man. He has abused every tool, every weapon she has given him. Physically, he is a mechanical misfit. And, gentlemen, she has determined to kill him off and groom some other animal to take his place!"

A STIR of interest among the scientists.

"You speak of Nature as if she were an all-powerful ruler," Smedley protested.

"Isn't she?" Saran replied. "The cleverest ruler reigns with the least ostentation. Nature obliterated the dinosaur gradually. She is annihilating us less gradually. We ourselves are doing her work by proxy."

Saran's hands went out to grip the back of a chair, and he leaned forward to fix the men with his sharp glance.

"The Third World War has not been over six months. New weapons entered that conflict—new explosives. One of those explosives filled the upper atmosphere with a gas, which intensified a certain ray to the point where it has the power to kill the weaker forms of life—such as newborn infants."

Rutters snorted. "Clearly a half-developed hypothesis," he scoffed. "Dr. Hartley has proved to our satisfaction that a germ is causing the plague. In a special ward at General Hospital this was made certain only yesterday."

A bleak smile curved Saran's lips. "May I ask how?"

Hartley savagely chewed the stem of his pipe.

"I wouldn't say the matter was proved as yet, *Herr* Rutters," he growled. "The point is this, Mr. Saran. I filled a chamber with a heavy gas, and the delivery in one of the hospital's maternity cases was made within it. The child is still living, twenty-two hours later."

He smiled quizzically at Saran. "You see why we scoff at your 'ray' assumption, *Monsieur*. We have definite proof otherwise."

"Proof! One case! I can explain your apparent success, Dr. Hartley. The heaviness of the gas within that chamber partially protected the newborn child. It remains to be seen how long the infant lives. And there is this—have you not noticed an increase in old-age mortality?"

"Why—" Ferguson, the Englishman frowned. "A slight one, yes."

"There you are! These rays have the power to kill all of us; given time! But the weak are taken first. Eventually, we will all succumb. Unless my plan is put into practice immediately, Earth is under sentence of death!"

Hartley asked quietly, "Just what do you propose?"

"Enormous glass shields to cover every large city in the world. Here all must live until the atmospheric condition is remedied—if ever. Shields that we must never venture outside of—a glass cover for every metropolis!"

"Ridiculous!" snorted Rutters. "The thing is im-

possible. The coefficient of expansion of the best glass would make such a thing impossible. The domes wouldn't last a week. They'd shatter on warm days. Fall to pieces on cold ones."

Saran shook his head at the man's ignorance.

"Brush up on your physics, *Herr* Rutters," he advised sarcastically. "The Sjorn Theorem postulates that if magnetic rays are made to flow transversely to the grain of the glass, expansion and contraction are eliminated."

In the brittle silence that followed, Saran sucked his breath in noiselessly. The scientists exchanged glances in wonder, then focused their gaze on Saran. The girl stared at him curiously. The moments fled and presently, Hartley cleared his throat to speak.

"The Sjorn Theorem, Saran? I, for one, have never heard of it! Nor of such a thing as expansionless glass! Where did you study physics?"

CHAPTER III

Domes of Death

PANIC brought the blood to Saran's face in a swift flood. He hadn't dreamed Earthly science could be so backward. But as he groped for words, something took place that temporarily saved him. The door opened and a girl entered.

She compared favorably with Helen Wade for breath-taking beauty. But hers was the quiet kind, where Hartley's secretary possessed the flamboyance of rich red lips and black hair. The new girl was blond, with steady, grave eyes and a self-confidence that even the startled Saran was able to admire. She went to Moss Hartley hurriedly.

"The hospital, Dad!" she breathed. "Something's happened. They want you right away!"

A hardness settled upon Hartley's seamed features.

"They—they didn't say what it is, Enid?"

"Nothing, except that there's been a change. I told the chauffeurs to have the cars ready."

Hartley dived for coat and hat. The others swarmed for the door with black desperation written in their eyes. Hartley paused on the threshold, glanced back.

"Drive this young fellow over, will you, Enid?" he clipped. "I think he's crazy, but he interests me. And Miss Wade—see that no more of these so-called scientists get in, will you?"

Saran, as he went out, saw penitence in her averted eyes, mischief in the quirk of her lips.

A private elevator lifted the group to the seventy-fifth floor of the monstrous General Hospital. An interne led the way down the hall, to turn into a small room where a nurse waited. Saran's glance went to the closed door beyond her, sealed with black tape. She began to strip off the tape as they entered.

Very soon they were filing silently into a darkened room filled with dense, sour-smelling gas. A light came on, glowing like a street lamp in the fog. The nurse hurried to a glass-shielded incubator. Tears glistened

in her eyes when she turned to Hartley. But no words came from her trembling lips.

Saran was standing by Enid Hartley when she looked into the incubator. He could feel a shudder rack her body. With a muffled sob she gripped her father's arms and hurried her face against his coat, slim shoulders trembling.

Saran looked down. On a bed of soft blankets he made out the tiny red form of a child. A child whose head had swelled to twice the size of its body, whose legs were long, spaghetti-thin tendrils and whose arms had shriveled up. The face was like a shapeless mass of pink dough. Life was in the infant—but a ghastly sort of life, born of chaos.

Saran felt his heart twist within him. He tried to stem the waves of pity that swept over him, and failed dismally.

The scientists were silent. This, then, had been their bid for salvation for Earth—this helpless little imbecile to which they had fastened their hope. Hartley's voice was a husky whisper.

"Remove the gas, nurse. This—is this horrible."

As light and air began to pour through the open window, he turned to Saran.

"You were right," he muttered. "No germ could have penetrated that antiseptic gas. Will you come back with us? I believe we are ready to listen, now. God knows you cannot fail more bitterly than I have!"

IT was a silent pair who returned in Enid Hartley's little coupé. The dejected girl drove listlessly, as if some vital spark had died within her. Grimly Saran reminded himself that he had no part in this tragic affair. Earth had brought disaster upon itself by its own intolerance. Earthlings had murdered his father for having revolutionary ideas. Such a race did not deserve to exist!

But he gained only a measure of peace. Ryg had schooled him in the theory that only the strongest intellectually deserve to live. Saran's brain could see the logic in that; his heart could not.

Finally the girl came out of her dark reverie.

"So you, too, have a theory," she remarked. "Do you think it will work any better than dad's?"

Saran was quick to accept the challenge in her question.

"I am sure of it," he replied. "In my laboratory I have caused bacteria to propagate normally, something that has not taken place during all these months."

The girl's eyes were dark and brooding. "It's ghastly," she murmured. "All these horrible little changes that serve to remind us constantly that life has ceased to exist—new life, I mean. Even bacilli are dying off. Dentists report that tooth decay has completely ceased. Undertakers say that embalming is unnecessary now."

"Corpses remain just as perfect as though still alive. The world will be overflowing with dead in a few years. Animals, birds, rodents—they will lie right where they fall, for all time, or until squads of gravediggers bury

them. Death all around us, and not a new life brought forth this year!"

Quickly the girl stifled the hysterical crescendo of her words.

"I'm sorry," she said. "Forgive me for letting loose. If I don't seem any too confident in this theory of yours, it's because I've seen dozens, scores of plans tried, all of them to fail."

Saran shrugged. "I know. But you'll pardon me, too, if I don't seem worried by it all. You see, I happen to have faith that I can stop this plague!"

But he would tell her no more than that. His advice was to wait until they returned to the laboratory, and see with her own eyes.

An hour later they were all gathered in Hartley's private laboratory, waiting while Saran gathered a few things together that he would need in his proof to the scientists. They evinced a little more respect when he addressed them for the second time.

"I mentioned the Sjorn Theorem and expansionless glass," he reminded casually. "Unfortunately, I am not at liberty to tell you all there is to know about these matters. The man I studied under is one of the greatest scientists who ever lived—and yet you would not know his name if I told you. But as to that glass, gentlemen. Watch!"

Deftly he strung wires in an intricate maze involving condensers, tubes, a rheostat. They were connected to a long bar paralleling a strip of glass about two feet in length, suspended over several Bunsen burners. An electric measuring device would record the slightest expansion of the glass plate. Saran switched on the juice to the magnetic set-up, lighted the burners.

In a few seconds, the glass was glowing pink. Smedley watched dubiously. Hartley was intent, the others torn between a desire to scoff and the fear of making fools of themselves if they did.

And the glass remained unchanged! Not a millimeter did it expand!

The quartz was heated almost to the melting point, but the electrical recorder was silent. Saran suddenly began to chuckle.

"Prognosis positive," he smiled. "I continue to demonstration Number Two. Mr. Smedley, can you find me a culture of good, lively bacteria? *Proteus vulgaris* will do."

Saran was conscious of the silence within the laboratory. Deliberately, he took his time about arranging a watch-glass of bacteria beneath a microscope. The bacilli were dormant until he added liquid. Hartley had to keep them in a semi-dry condition, or through self-division they would soon have annihilated themselves. When Saran pressed a button, a small screen projected an image of the swarming culture for all to see.

Immediately, the rod-shaped bacteria commenced to multiply through self-division—gradually lengthening, then splitting in the middle. But where, under ordinary conditions, the population would thus have been

increased, both halves of the new, struggling pair died instantly. They were too weak to withstand the barrage of deadly energy-waves Ryg's stations created.

THE smiling, tanned young scientist had taken a circle of blue glass from his pocket. Casually he held it atop the watch-glass, so that the bacteria were shielded.

Silence; the kind of dread quiet when lives are at stake. Then through the room coursed a current of shock. Rutters and Massetti slowly got to their feet, their faces white. Hartley's pipe hit the floor with a loud crack.

Helen Wade's voice sheared the hush. "Doctor—they're living!"

There was a rush for the microscope to verify what the screen showed. One by one the scientists pressed forward to eye the living, propagating bacilli. All lifted strained, white visages to Saran. At last he spoke.

"Convinced, gentlemen?"

Something like worship was in Enid Hartley's face. Tears stood in her eyes.

"Would it do that for children?" she whispered. "Would it help the millions of future mothers to keep their babies?"

"I don't know why not," Saran replied confidently. "Am I to have the chance to prove it, Dr. Hartley?"

Hartley shoved his hands deep in his pockets.

"How soon can you turn out enough of that glass to insulate an entire maternity ward?" he grunted.

"As fast as you can supply me with ordinary window glass and a few special chemicals. The bluish color is sprayed on. We can have the work done by to-morrow night, if we hurry."

"Then what are we standing here for?" roared the elderly scientist, abruptly. "Smedley, have the glass here in an hour. Ferguson, Rutters—and the rest of you—get things ready for high-speed production. What materials will you need, Saran?"

Saran told them. Hartley barked orders, sent the dignified men of science scurrying out like common errand boys. At last only three of them remained, Hartley and his daughter and Saran.

"You'll stay with us, of course," Hartley decided curtly. "Enid will find you a room. If you need rest, you'd better get it now. We'll be working all night and all day."

Saran murmured: "Thank you, Doctor. I could do with a little sleep."

He was on the point of following the girl from the room when the physicist called him back. Hartley was studying him intently.

"You said your name was Sarah," he mused. "It wouldn't have been Saunders once, would it?"

Apprehension laid a cold stream along the younger man's spine. He shook his head, searched Hartley's face. For "Saunders" was the name written in many of the books he had read that were taken from the fatal space ship in which he and his father, years be-

fore, had been condemned to death.

"I just wondered," Hartley shrugged. "I had a very dear friend once by the name of Lawrence Saunders. Your resemblance to him is remarkable. But he's been dead these twenty years, poor chap; he and his wife and boy. God knows what became of them, out there in space—"

Saran's fists were balled up hard and his lips were dry.

"Out—in space?" he said huskily. Inside him a monotonous voice kept droning that his ruse was already detected, his usefulness to Ryg at an end.

"A brilliant man, Saunders," the other mused. "Yes, and a great-hearted one. He was on his way to Jupiter with his family, to accept a post among the natives there and try to wipe out the dreaded *lakna* epidemic. The last thing he radioed back to us was of an unknown ship scuttling them. He spoke of strange beings like jellyfish. Then his radio went dead."

Shrugging, Hartley turned away. "Ah, well, it was just an idea. Get your sleep, Saran."

But Saran did not get his sleep that night.

Turmoil tore at his brain. Hartley was lying! But why? To confuse him? But who should want to do that—for who knew his purpose on Earth? Only—The Other. And if The Other had turned traitor—warned Hartley. . . . Did Hartley then hope to mollify Saran's hate with lies? But why should Hartley listen to him, knowing who he was? There was no answer, and it tortured him.

IT occurred to him that his fears were ridiculous. Hartley could have basis for no such suspicions.

But he resolved to bend every effort toward caution. Once let those glass domes be raised over Earth's cities, as he planned, and his work was done. For, given time, the glass would do more than appeared on the surface. It would save mankind from one fate, a fate that Hartley's work was in danger of eventually averting, but it would bring on just as certain a doom.

Exposure to the blue light for a few months would render every man and woman on Earth sterile. And no scientist's skill could restore the miracle of reproduction, once it was lost.

CHAPTER IV

The Second Visit

THE spring-steel tension of those next few days was never forgotten by any who lived through it. Four squirming, red-faced little beings came into the world in General Hospital's special ward—and lived. More babies were born under Saran's blue glass and more shields were raised. *Not a child was lost in two weeks!*

A month, and the news flared across the world. An American scientist had achieved the miracle. Life had resumed in America! How was it done? How could other cities duplicate the feat?

Saran sent the answer back with Ferguson, Ferrin

and Massetti. They, and the men they trained in the work, carried the legend of his wizardry far and wide. Special maternity wards went up overnight. Immense glass domes lifted from the Earth within a matter of months. Tunnels of glass linked the metropolises. Life took on a surrealistic aspect.

A terror was born in mankind of the naked rays of the sun. Farmers tilled their fields under strange glass umbrellas. Where plant life had failed to withstand the deadly rays, they were transferred to immense greenhouses, to grow in immunity. Telephone linemen and others who must labor in the open country wore spun-glass armor. Within the mighty hemispheres that arched above the cities, an eerie blue twilight dwelt. But men and women could stand the ghastly look of each other in knowing death had been routed.

Dentists rubbed their hands in glee. Every day saw more decayed teeth coming their way. Starving physicians admitted relief as bacterial diseases again broke out in normal amounts.

But Saran, who knew that another two months would see them all doomed, was far from glad. Worst of all, he had fallen in love with Enid Hartley. He who had plotted the destruction of her kind, found himself longing to be her mate.

Strange, fierce yearnings made life a hell for him. Constantly he had to remind himself of the superiority of the Korjans to these people whose joys and sorrows he now found himself sharing. And there was another who observed his vacillation.

One night, after a drive with Enid, he returned to his room to find a neat, white card lying on the pillow. Typed on it was a cryptic command:

"Be in the field tomorrow at midnight. Ryg is displeased."

Something froze inside him. In his furtive, semi-happiness with Enid, he had forgotten that the eyes of The Other were on him constantly. Staring at the card, suspicions crawled like ants through his brain.

Who was the other spy? Rutters, who had not returned to his own country, on the excuse of wanting to study Saran's methods further? Smedley, the sardonic one? With cold abruptness, Saran remembered the warning: "—the one you suspect least!"

The man Saran suspected least was Moss Hartley.

MIDNIGHT the following night found him driving into the Tehachapi Hills, far beyond the end of the glass tunnel. He parked in the brush and walked slowly up the hill to the little hollow where Ryg had landed before. Then he saw it, silvery-white in the moonlight, like a thimble set on its base among screening bushes.

The door was open when he reached it. Saran shook off chains of aversion and strode inside.

Instantly, light flooded the space ship. Beyond the partition, he made out the spongy presence of the Korjans. Ryg's voice burned itself into his brain.

"You have failed us! What of your oath, Saran?"

Diagnos pilled upon him. Nothing had ever nauseat-

ed him as did the gelatinous appearance of the man he had once admired. Those ghastly green orbs, floating in mid-air— His gaze fell before the hot accusation in their translucent depths.

"I have not failed, Ryg," he made protest. "Within another month Earth will be a planet of the sterile. Fifty or seventy-five years, and you can take possession."

"Bah! I told you I have done with wasting time. Earthmen are resourceful. In that time, they might find a new means of reproduction. Even as the man Hartley was trembling on the verge of discovering our energy stations."

The string of vituperation broke, resumed more quietly.

"I saw strange domes of glass as we landed tonight. Is that part of your work?"

"I had them erected to stop one plague and cause a worse one. The Earth people are ignorant of their danger. Thus they are blissfully rushing toward disaster."

"Rushing!" Ryg sneered. "Fifty years! I will soon remedy that. You employed the Sjorn Theorem in these domes of yours?"

Saran nodded, wondering what was back of the question.

Then for a while only jumbled thought-sequences entered the young Earthling's mind, as Ryg consulted with his ministers. At last:

"You will do as follows," Ryg commanded. "Find the magnetic plane of the human brain. Alter the frequency of the Sjorn impulsors to correspond to this plane. Then have the power output doubled, on some pretext, in every dome you have erected."

Saran's lips curled in contempt. "I thought you said the men of Earth were the barbarians. What do you call yourself, proposing such a plan? It would break down the brain cells, make a race of idiots out of them! It would mean reversion to savagery!"

"Exactly! Mankind would butcher one another, the strong would prey upon the weak. They would gut their civilization within a year. And their very sterility would take care of the rest."

Saran's head went back a little. "I will not do it! Perhaps I have enough of my weak and savage ancestors in me that your greed and ruthlessness disgust me. And by the way—you have always taught me that my father and I were exiled as martyrs. Hartley says Lawrence Saunders left Earth voluntarily!"

"Hartley!" Ryg sneered. "You put this lying moron's word before Ryg's? I have told you the truth, Saran. What reason had I to lie?"

The Earthman frowned. What Ryg said was logical enough. Ryg had no reason to bring him up as his own son, to teach him the intellectual treasures of Korja.

Ryg's eyes went crafty. He struck at the psychological moment.

"I will forgive you your faithlessness, Saran, if you follow my commands from now on. Do not try to

betray me again. The Other is always in touch with me. Nor will I be far away at any time. Tomorrow night I will expect your work to be finished, and you will rejoin us here."

Saran seemed to feel the fingers of a giant hand closing about him.

"You are the Leader," he murmured. "I—I will not fail you."

Exultation stirred the Korjans behind the glass. Ryg said, as he had said on another night long since:

"What is your supreme duty, Saran?"

And Saran made the answer that strangely galled him now.

"My duty is to Korja. I owe allegiance to Ryg, unto death."

But later that night, as he tossed on his bed, he asked himself if any oath of allegiance could stand the test of such unreasoning cruelty.

IN the laboratory next morning Saran was strangely sullen. Work had gone on for weeks on the ever present problem—the cause of the fatal radiations. As he watched Smedley, Rutters and Hartley laboring over abstruse formulas near the window, he realized how close they were coming to the truth. Slowly he walked toward them.

Hartley glanced up, as the younger man's shadow patterned the table. His brows drew into a querulous V-shape.

"We've got to make a change in the domes," Saran announced curtly.

"But why?" Rutters shrugged. "Aren't they working satisfactorily?"

"So far. But winter is coming, and I don't know how they'll stand the weight of snow in the colder countries. We've got to vary the impulsor frequency and double the output. That should give enough heat to melt the snow as fast as it falls."

Hartley's eyes roved over his face intently. He didn't appear quite satisfied with the explanation.

But: "As you say, my boy," he gave in. "I'll give the order and have it sent everywhere, all over the world. Have you decided on the procedure?"

"Give me an hour," Saran growled. Jamming his hands in his pockets, he left the room.

He had not been at work more than twenty minutes when Enid came quietly into the small laboratory. Though she spoke, Saran did not look up; only answered gruffly and continued his work. For a while he was conscious of her moving about, straightening things up, occupying herself in a hundred inconsequential actions that betrayed her inner turbulence.

Finally she was stopping by his chair and turning his face up to hers with a fingertip under his chin.

"There's something wrong," she said. "What is it, Saran?"

"Nothing! Why should something be wrong, merely because I have to work?"

"It's more than that. You're troubled."

He pushed her hand away, failed to meet her gaze.

Then she was saying sadly,

"There are times when you seem strange, Saran. We know so little of you, really. Once you said you aren't John Saunders. But—tell me the truth: are you Lawrence Saunders' son, or not?"

Saran went rigid. Suspicion again! His fingers locked on the pencil in his hand so hard that the wood cracked. In the next instant, Helen Wade entered with a mass of data.

"Telephone, Miss Hartley," she announced cheerfully.

Enid bit her lip. "Thanks," she murmured. She went out with the question still unanswered.

Before long she was back. "It's strange," she said. "The party was gone when I got there. Who was it, Miss Wade?"

"I couldn't say," Helen told her. "It was a man's voice."

Saran knew a vagrant gratitude for her interruption. Enid didn't pursue her inquisition, with the secretary listening.

It was shortly after Enid had departed that Saran got the brilliant idea. He came straight up on the edge of his chair.

"Miss Wade!" he jerked. "Do they keep old newspapers on file in the library?"

"Why, certainly," the girl told him. "Is there something I can look up for you?"

"No, it—I'll take care of it myself."

He drove recklessly from the Beverly Hills mansion into the metropolis, conscious that the answer to all his problems lay in a twenty-year-old newspaper in the library's files. In it he could find the truth regarding Lawrence Saunders' death.

Had he actually been exiled by Earthmen? Or—*had Ryg scuttled the space ship and kidnaped the scientist's boy?*

IN an ancient, yellowed copy of the *Post*, he found the story. The bold-faced words served to set his blood on fire:

SAUNDERS FAMILY MURDERED OFF PLANET JUPITER AFTER ATTACK BY SPACE PIRATES

Lawrence Saunders, brilliant scientist, died yesterday, as brave in death as he had been in life.

While weird pirates from the void, who needed no space armor to withstand the rigors of the pressurized vacuum surrounding the ships, worked with drills to break into the *Volant II*, Saunders reduced terse accounts of the efforts to save himself and his wife and boy. He glimpsed the attackers as octopuslike beings, as transparent as molten glass.

His loss to the world is one that will not soon be forgotten.

The paper fell from Saran's listless fingers. Suddenly there were tears in his eyes. Then, with terrible fear clutching at his heart, he darted from the building.

He found Hartley and the others gathered in the main laboratory waiting for his arrival.

Wild-eyed, panting, he clutched Hartley by the shoulder.

"Have you put in that call yet?" he demanded.

Hartley indicated the telephone with its receiver off the hook.

"Ferguson and the others are waiting."

Saran picked up the instrument, cut the connection by replacing the receiver in the prongs. At the scientists' astonished exclamations, he squared off before them.

"Listen—all of you," he snapped. "This is going to be more than a confession. It's a command as well. I've led you into a trap that was meant to blot all life from the face of the Earth. Now I'm ready to tell you how to avoid that trap!"

Tension leaped through the room. Saran's dark eyes glittered. He was watching for the one man or woman—for even Enid and Helen weren't above his suspicions—whose expression did not betray surprise. And he found that only Moss Hartley failed to look shocked.

He told his story with such force that it seemed no one breathed during the recital. He told it with so much sincerity that there was no cry of "Traitor!" from a single throat. Only amazement—and eagerness to hear him out.

Hartley was the first to stir. He got to his feet and extended an acid-stained hand.

"Thank God for men like you!" he breathed. "You had the intelligence to question your orders and the courage to act. But don't think I haven't known who you were, John Saunders. I was only biding my time, waiting for you to tell us all.

"You slipped too often. You never explained the 'Sjorn Theorem' to my satisfaction. Once you referred to a 'dargol'; later, I learned you meant 'day'. Now that you have helped get us into this predicament, how are you going to get us out?"

"There is only one way to do that," Saran said incisively. "It will mean the utmost care at every step. One of us here may be The Other I mentioned. If so, Ryg will know of our plans before we are well started. He expects me tonight. I can lie to him and make him think his orders have been followed. That will give us two or three days in which to work."

"What can be done? Evacuate the glass globes?" Rutters queried.

"Every one of them must be destroyed," Saran nodded. "We will insulate all hospitals with the glass, but other than that, it will be far less harmful to remain in the direct path of the rays. We must enlist thousands of aviators and equip them with electroscopes, which will detect the energy stations fifty miles away. Every one that is found must be bombed. Since there are hundreds spread over the Earth, it may take weeks."

"What do we do now?" Smedley growled. "Just sit here?"

"Nothing, until I've talked with Ryg. He may have other cards up his sleeve; I don't know. But I do know this: unless the six of us remain here, all together, until time for me to visit Ryg again, the Korjans will know what has happened. We're going to

sit tight for two hours, and wonder which of you is the traitor!"

THE strain of waiting rasped brutally at the nerves of them all, as the minutes tolled off. Dusk wore on, and Hartley had dinner brought in. But few touched their food; they were too occupied with watching each other like hawks.

With darkness spreading across the sky, Saran stood up.

"Eight o'clock," he grunted. "I'll just have time to make it. As a special precaution, suppose no one leaves the room before midnight. Good night!"

His hand palming the knob, he froze. Someone was speaking softly.

"Not so fast, my friend. We are all going to meet Ryg tonight. Put your hands up!"

He whirled around, to see Helen Wade standing at the head of the table with a gun in her small fist. A tight little smile had frozen her lips.

Enid whispered: "You! We—we should have realized. All of the others we've known for years."

The brunette's eyes looked hard as steel. She let the gun slant down at the other girl.

"Of course you should have known. But that is where Earthly stupidity held you back. Saran, I could kill you right now and enjoy it. But Ryg's plans must not be crossed. I was told to let you live, whatever happened. He has ways of using the brains of even traitors like you. And these others—he may desire them, too."

Enid came to her feet, eyes blazing. "How you, a woman, can be a party to such brutality is incredible! Can you still believe the lies this Ryg has fed you on, when you see the lengths to which he will go to gain his ends?"

"Lies!" sneered the girl. "There are more liars right in this room than on all the planets of the Dark Star. Like Saran himself, I was rescued from death by the Korjans. And I intend to repay that debt. Open the door, Saran."

Saran advanced a step toward her.

"Think, Helen!" he said sharply. "Ryg told me he was my benefactor, and I have proof he actually murdered my parents. Why he saved me is obvious: he was planning for this invasion even then, needed go-betweens like you and me to do work the Korjans couldn't accomplish. Are you going to let yourself—"

Fanatical hatred was in the brunette's pale features. The hammer of the little revolver inched back.

"Open that door and walk out in single file," she breathed. "We are leaving the back way. Make a single false motion, and I'll kill every one of you! I have enough bullets in here to accommodate you all. And then where will your precious Earth be?"

It was that thought, rather than the menace of cold steel, that made Saran obey her orders. Within ten seconds, the group was filing somberly out the back door. Helen Wade took no chances. She motioned Hartley, Enid and Saran into the front seat of Saran's

car, forced Smedley and Rutters to lie down on the floor of the back seat. Then she perched on the rear cushions with the gun ever vigilant.

"Now—drive!" she commanded.

Saran's nerves tingled like live wires all the way to the rendezvous. Bitterly he realized he had plunged them all into this predicament. Yet no opportunity developed to disarm their fanatical captor.

There was something different about the space ship this time, when they clambered toward it up the rough terrain. Saran's heart leaped when he realized what it was.

Ryg and the others were outside, in bulky space suits! Saran tried to keep his emotions out of his face. For this was their first break—and a slim chance it was.

With queer, octopuslike waddling motions, the four Korjans scuttled toward them. Ryg's thoughts lashed across the intervening distance.

"Again you have failed me, Saran. For the last time! You did well to bring him, Urna. Who are the others?"

Helen Wade said bitterly: "This is the man Hartley, and his cohorts. They are intelligent but misguided. I thought, perhaps—"

"My brain museum?" Ryg trembled all over with eagerness. "Welcome additions! When I have subjugated their minds, they will be useful to us."

HARTLEY recoiled as the master of Korja approached him.

"You damned, gelatinous monster!" the physicist spat. "Do you think you're god of the universe, to plan such a thing?" He aimed a kick at the wrathful Leader.

Two of the other three rushed at him with waving tentacles—and that was the chance Saran had prayed for.

In a flat, swift dive, he sprang squarely into Ryg's middle. Turmoil reigned. Helen Wade screamed at him, but held her fire for fear of striking the Leader.

Then for a moment Saran and Ryg were tumbling down the slope in a mass of writhing tentacles and kicking legs. Ryg's power was that of a boa constrictor. But his bulky space suit hampered him, and it gave Saran a chance to get behind him and force him to the ground.

His superior weight bore the smaller creature down. Seizing a rock, he began to batter at the man's helmet. The thick, resilient glass bent a little. Ryg screamed curses, struggled like a bundle of lashing snakes.

"Kill him, Urna!" he shrieked. "My helmet is breaking!"

The girl began edging around them, striving for a shot at Saran. But he was quick and vigilant enough to keep Ryg between them constantly. It came powerfully to him that here in this spot, the fate of Earth was being decided. That was spur enough to drive him to the utmost of his strength.

Again and again the rock crashed against Ryg's

armor. The other Korjans were all occupied with the remaining Earthmen. Rutters had found himself a rock and begun to hammer at the face of one of the Korjan ministers. Enid shrank back against the ship.

Then Saran heard the sound that lighted hope within him. A thin, high hiss. The sound of air leaking into the monster's helmet!

Ryg screamed horribly. "Kill him! Get him off me! I've got to get in the ship. My armor—"

Helen discarded caution. Her gun spoke twice. Saran felt Death pluck at his shoulder. But in the next moment a deafening whistle burst from Ryg's helmet. Before the Earthman's horrified eyes, the Leader's body seemed to dissolve into a mass of tiny green globules. His eyes shrank in size, then burst. And suddenly his brain ceased to shriek imprecations and pleas for mercy.

Hartley, too, had acted in that instant. Helen Wade saw him too late. Hartley's lanky body crashed into hers. While she was reeling back from the impact, he tore the gun from her fingers. Quickly he pivoted, leveled the revolver at one of the monsters.

The thunder of his shot was echoed by a shrill whistle from another Korjan's space suit. Hartley swung the pistol on the creature struggling with Rutters. With its face-plate shot away, the Korjan dissolved into harmless protoplasm.

There was only one of the invaders left, and Moss Hartley coldly blasted it into eternity. But even as the echo of the shot ceased to roll back from the hills, a new sound reached their ears. The clang of a door closing.

With one impulse, the four men sprang forward. Helen Wade had gained the rocket ship and locked herself in. Now, with a broken sputtering, the jets came to life.

Saran shouted: "Back! The blast will burn us alive. Let her go!"

Barely in time, they reached a little grove of trees and watched the ship flame into the dark sky. Enid's hand groped for Saran's clenched fist. His fingers locked on hers with sudden buoyancy.

"We've won!" he breathed. "Beaten the greedy little monsters at their own game."

"But Helen—" Hartley was voicing the question in all their minds. "Will she be back with other Korjans?"

"If she is, we'll be ready for them next time. She's doomed herself to the hell of living among the Korjans in their dying universe."

"Does that sound so terrible to you now, Saran?" Enid was smiling up at him.

HE shook his head. "This is where I belong, among my own people."

His face turned toward the city. "But there is not time to talk of these things now. I have a debt to Earth that must be paid. After the last energy dome is destroyed, there will be time for—other things."

Enid smiled happily, knowing what was in his heart.

SMALL MIRACLE

By RANDALL GARRETT

*Way up there in the thin air
your senses start playing
tricks. Or do they?*

MAJOR August Cantrell, USAF, was by no means a nervous man. You don't get very far in the Air Force if you're nervous, and certainly you wouldn't be allowed to pilot a jet plane that cost upwards of a million dollars, which is just what Major Cantrell was doing in the Air Force.

But, nerves or no, the major felt just a little queer when he heard the voice in his left ear.

"Major Cantrell," said the voice, "I'd like a word with you."

Now, let it be said at the outset that Major Cantrell was not unused to hearing voices in his ears. Indeed, he heard them frequently. A jet pilot wearing a helmet with earphones gets used to the phenomenon rather quickly. But there was something about this voice—something the

major couldn't quite place—that worried him.

He turned on his throat mike. "Who's calling? This is Major Cantrell—" He gave his identification. "—over Omaha, Nebraska. Who's calling?"

"My name," said the voice, "is Quadgop. There's no need to use your microphone. I can hear you quite well without it."

"This is a U. S. Air Force wavelength," Cantrell snapped, "get the hell off the air and quit playing tricks."

"Please, Major," said the voice, "if you'll just lend me your ear for a moment, I'll explain."

"It better be good," said the major. If there was anything he hated, it was practical jokes—the kind that fiddle around on telephones and radios, trying to be funny.

"All right, then," said the voice that had identified itself as Quadgop, "shut off your throat mike."

The major thought it over and shrugged. What could he lose? He took a look around to see if there were any other aircraft near him, but the thin air was clean for miles around. He shut off the throat mike.

After all, it just might be some sort of Air Force test. He doubted it, but it was still possible.

"But if it's a joke," he said aloud, "somebody's going to be in trouble."

"It's no joke, I assure you, Major," said Quadgop.

"Whup!" The major checked his throat mike again. It was definitely off. "How did you hear me?"

"Oh, we have our ways," said Quadgop, chuckling.

"We? Who's 'we'?" Cantrell asked suspiciously.

"I'll explain in a moment. First, I want to make sure that my identification is correct. You are Major August Cantrell, USAF, Serial Number 0-633919?"

"That's right," said Cantrell.

"You wrote the book entitled *The Air Force and the Unidentified Flying Objects*?" Quadgop persisted.

"That's right," Cantrell repeated. "So?"

"You made the statement in that book that you don't believe that any extraterrestrial visi-

tors would necessarily be warlike or bent on conquest, but should be treated with wary respect and a show of friendliness until and unless they prove themselves hostile."

It was an almost perfect quotation from his book.

"Do you," asked Quadgop, "still believe that?"

"Certainly," said Cantrell. Then he laughed. "I get it now," he said; "I'm being ribbed. Next you'll tell me that you are an extraterrestrial—from Venus, I suppose."

"No," said Quadgop, sounding a little irritated, "we are not from Venus. We are from Merca, a planet some four hundred light years from here—a good deal farther away than Venus."

"Oh, come off it," said Cantrell, forcing a chuckle. But there was something about that voice that was oddly convincing, even to him.

"Major Cantrell," said Quadgop, becoming even more irritated, "we picked you for our first contact because we felt that you would be more understanding, more receptive to us. We do not want to fight Earthmen; we want to be received as friends. We feel that you would be in an excellent position to open negotiations for us. Please don't act as though this were a hoax."

"All right," Cantrell agreed. "Just for the sake of argument, we'll assume that you're on the level. But I won't completely believe it until I see you."

"That's fair enough," agreed Quadgop.

"I suppose that when I see you, I'll know you're not Earthmen, eh?" the major asked. "I mean, according to reports, you're little green men, two and a half or three feet high."

Quadgop laughed sardonically. "You have an entirely erroneous idea of our size, Major, and I assure you, we are *not* green. As to our physical shape, we are bilaterally symmetrical mammalian bipeds. Frankly, we look almost exactly like Earthmen."

"Oh, sure," said the major sarcastically, "just like us, except that you wear a Flash Gordon uniform and carry a Buck Rogers ray pistol."

"Believe me, Major," said Quadgop, "if you saw me, you would know instantly that I am not an Earthman."

"Look, Quadgop," Cantrell said patiently, "I'd like to be-

lieve this isn't just a gag; I really would. But I've seen too many of the boys being razzed because they fell for some practical joke like this. If you could just prove—"

"Major," Quadgop interrupted, "can I trust you?"

"What do you mean?"

"I mean, you wouldn't try to kill me would you?"

"Hell, no! Why should I?"

"Very well, then. I'll trust you. I *must* trust you. It's the only way."

"What are you talking about?" Cantrell asked. "Are you going to bring your saucer down here or what?"

"Oh, nothing as complicated as all that," said Quadgop. "Just take off your helmet, that's all."

"Take off my helm— But, *why?*"

"Because I'm sitting in your left earphone," said Quadgop.

THE END

(cont. from page 105)

Of course, the grandest idea of all—again from science fiction—would be to move the planet outwards from the sun into another orbit where the natural temperature would be lower. We might also speed up its rotation to give a shorter day, closer to that of Earth. Maybe if and when the photon rocket or some kind of antigravity can be developed, such tremendous feats as moving planets will be possi-

ble. But it will be a long time before science can hope to catch up with science fiction in this development.

However, science most certainly can catch up with science fiction in giving us a habitable Venus. We're almost capable of sending out the first rocket probes with spores aboard. With a whole planet up for claiming, there can be no excuse for delay.

THE END

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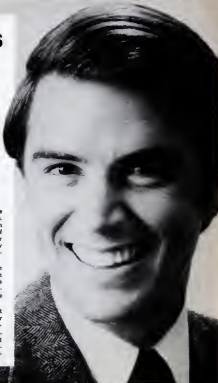
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